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THE AMERICAN ARCHITECT AND BUILDING NEWS

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ARCHITECTURE

ENGINEERING

DECORATION

CONSTRUCTION

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(Gelatine Print issued only with Imperial Edition.)
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Equestrian Monument to Spinetta Malaspina.
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The Technische Hochschule, Berlin, Germany.
House at Cincinnati, O.
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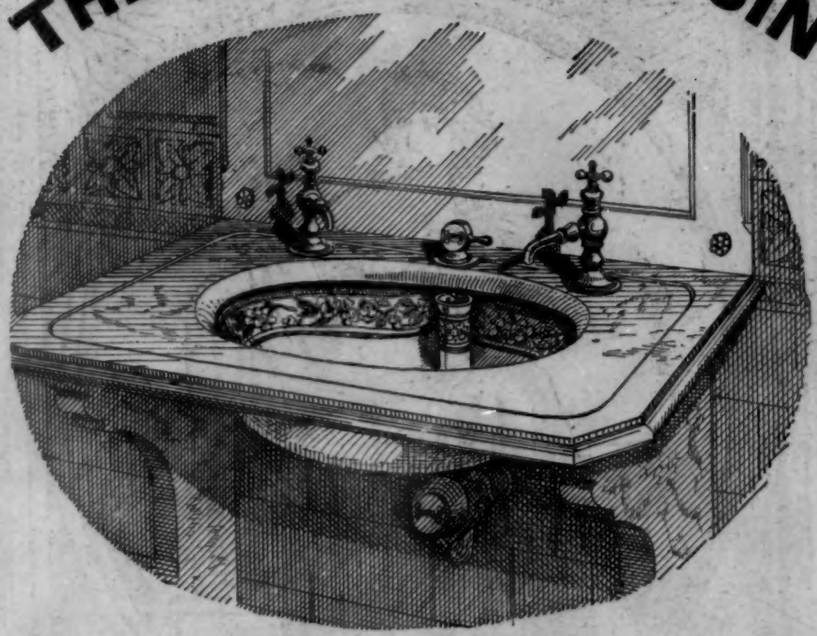

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THE Legislature of the State of Texas has passed the law proposed not long ago, requiring all persons who wish to practise as architects within the State to present themselves before a Board of Examiners, for the purpose of obtaining a certificate of competency, without which they cannot pursue the profession. The State Association of Architects has approved the measure, so it is probably suited to professional ideas, and architects generally will watch its operation with much curiosity. One point of importance about the new law will be its effect upon architects from outside the State, who may be employed to do work there. We do not know the exact text of the bill as passed, but it has been suggested in other States that persons practising without a certificate should be denied the assistance of the courts in collecting payment for their services. If any such rule has been adopted in Texas, it will be best for architects from outside, however well qualified, to be cautious in accepting commissions for which they may never be able to collect their pay; and, if they should be caught in the unpleasant predicament of having to resort to force to defend their rights, to see that they apply to the Federal Courts, which would, we suppose, take no account of local regulations.

A NEW source of danger in hospitals and similar buildings has been pointed out by an Austrian military surgeon. According to him, several cases of infectious disease had occurred in certain Austrian barracks, and, after a strong, healthy artillery-man had been carried off in a week by an attack of typhoid pneumonia, the floor under his bed was taken up, and a mass of mould and fungus two yards square was discovered beneath it. The surgeon proposes, in view of the dangers to be expected from such conditions, that the walls and floors of barracks and hospitals should be covered with coal-tar, which is sufficiently antiseptic, he thinks, to prevent the formation of such growths, while it would cover up all seams and fissures with a smooth, impermeable coat, which could be washed with facility. If an architect were to propose such a thing he would be denounced as an ignorant and unskilful person, but because it is the suggestion of an amateur we suppose the experiment is likely to be tried, with great glorification of its inventor, who will be forgotten by the time the timber, shut out from the air by the impervious coating, has rotted away, and the coal-tar, converted into dust by the evaporation of the volatile hydrocarbons which keep it plastic, has been carried off in the lungs of the inmates of the building. To the mind of an architect, the existence of mould and fungus suggests the need of ventilation more than anything else, and we should say that opening the basement-windows, or rather, constructing the building on open arches, without any basement, as is now common for hospitals, with renewal of the floor, and removal of all impervious coverings that might keep the air away from it, would do more good than all the disinfectants, coal-tar included, that could be spread upon the interior.

AN architect sends to *L'Architecture* a warning, which we hand along to our readers, to the effect that if any of them should happen to be in the railroad station at Enghien, a little village near Paris, and should be tempted to lean against the iron columns which support the roof over the platform, they should resist the tempation, lest they meet the fate of Samson. As it is unusual for iron columns to collapse when any one leans against them, the case of those at Enghien seems to need explanation, which the architect gives by relating that while waiting in the station one day, his attention was attracted by some screws in the sides of the columns. The screws did not appear to hold anything, but looked as if they had been driven in at random, and closer observation showed that the columns so treated were broken in two across the middle, and the lower half was in some cases also split. The seams, as well as the screw-heads, had been puttied up, but did not escape the eye of the expert, who searched until he found one of the railroad men who could explain this architectural mystery. It then appeared that the columns had been broken, and mended by the ingenious process of arranging the fragments together, thrusting a stick through them, and screwing the portions of the shell to the stick. A little paint then gave the whole affair the appearance of perfect solidity, and, as the writer says, it will probably last until some crowd of holiday passengers presses against the columns and brings the whole affair down about its ears.

A QUESTION as important to architects and builders as it is common in their practice was recently decided by the highest authority in France in a particularly clear and succinct manner. As *L'Architecture* gives only the barest memorandum of the case, we can only infer what the circumstances may have been; but the details of the affair are not of much importance so long as the court clearly states the principle, as in this case, that "A town cannot refuse to pay for extras not included in the contract if such extras consist either in the execution of modifications from the original plan ordered by the superior authority of the Commissioners of School-buildings, or in work which was indispensable to the good execution of the building, and has been for the advantage of the town." In regard to the architect, the same decision says that, "Although the unauthorized extra work might have been included in the contract and specifications if they had been prepared with more care, the cost of them cannot be charged to the architect, but the commission which he would charge on these extra works may be withheld from him." Another point which seems to have come up in the same case, and which is of considerable importance, was decided by the court in the following words: "When the contract between the architect and his client allots a certain sum as the '*frais de déplacement*,' or compensation for being absent from his office, to the architect, the sum allotted may be increased according to circumstances." The story seems to show that the idea that the architect ought to pay out of his own pocket for everything that the owner wants in his house, which his omniscience did not enable him to discover before the contracts were made, occasionally makes its appearance in France, to meet with the same fate before the courts as in other civilized countries.

ACCORDING to the *Wiener Bauindustrie-Zeitung*, the Emperor of Russia has given his assent to the project for the construction of a railway extending from the present terminus of the Siberian line to Vladivostock, on the Sea of Japan. The route which has been traced for the road follows the north side of the Altai Mountains from the present terminus of the Siberian military railway to Irkutsk, and thence runs easterly, across the mountains, to the head-waters of the Amoor River. From this point it follows the Amoor Valley southeasterly until the river turns toward the north, when the railroad leaves it, striking southward to the coast, which it reaches at Vladivostock. The cost of this gigantic piece of engineering is estimated at four hundred and fifty million dollars, the total length of the line, from St. Petersburg to Vladivostock, being about sixty-two hundred miles, of which

more than a thousand is already in operation. As a commercial route the new line may not be immediately successful, but as an auxiliary to military operations it will undoubtedly be of the utmost importance. To say nothing of the fact that its stations, all of which will probably be fortified, as are those of the present Siberian Railway, will form a line of military posts close to the Chinese frontier, to which the Chinese can oppose nothing similar, it will bring St. Petersburg practically close to the door of Japan, and even in peaceful times will make St. Petersburg the market through which Japanese products must be mainly distributed to the rest of the world. According to the newspapers, Senator Stanford, of California, has had a dream, or a inspiration of some sort, in which he has perceived that the United States and Siberia would before many years be connected by a railway. Just how the railway is to cross Behring's Strait is not decided, nor, indeed, is it settled how a railroad is to be operated in winter in Alaska and Kamtchatka, but Russia seems disposed at least to do her part, and it is the turn of the United States to make the next move.

A CANAL has just been constructed in Belgium, in which, instead of locks, the boats are hoisted by elevators from one level to another. The canal extends from the coal region in the interior of Belgium to Brussels, crossing several other canals at the same grade, so that Belgian coal can be brought directly by boats to Paris, as well as to all the principal towns in Belgium and Holland. As the line passes over a rather hilly country, various ascents and descents must be made, and to save the long delays incidental to passing locks, the change of grade is made by means of hydraulic elevators. The boats, which measure about seventy tons, are towed at the low level into an immense tank, with gates, which is submerged in the canal. The gates are then closed, and the tank, which rests on the pistons of a huge hydraulic elevator, is raised to the upper level, when connection is made with the next section of the canal by means of double gates, and the boat proceeds on its way. The lift of the Elevator No. 1, at Houdeng-Goegnies, which is carefully described and illustrated in *Le Génie Civil*, is about fifty feet. The hydraulic apparatus is calculated to raise a weight of one thousand and forty-eight metric tons, or considerably more than the same number of our tons, and power is obtained by means of steam pumps, which force water from the canal into pressure tanks. The apparatus is double, so that two boats can be handled at once, and the ascent and descent, including all the operations of opening and shutting the gates and receiving and discharging the boats, occupies fifteen minutes. The cost of the apparatus, exclusive of earthwork and masonry, patents, engineering and purchase of land, was about one hundred and seventy-five thousand dollars.

THE *Sanitary News* reports a curious case of poisoning which occurred recently in London. At a children's party, at Christmas, which was enlivened by a Christmas tree, several of the guests, including older people as well as children, were attacked by singular symptoms, which could not be ascribed to any of the causes which usually produce the ailments incident to children's parties. Some particularly intelligent person seems to have noticed a resemblance between the symptoms and those of arsenical poisoning, and attention was drawn to the candles on the Christmas-tree, many of which were of a bright green color. Samples of the green candles were submitted to an official analyst, who reported that they were colored with arseniate of copper, and, presumably, in burning would diffuse vapors of arsenic through the air. Some of the red candles on the tree were also analyzed and found to contain vermillion, which might, we suppose, give off fumes of mercury during the burning of the candles. As thousands of Christmas trees are exhibited every year in this country, to many thousands of children, and the bright-colored candles burned on them must be counted by millions, it would not be amiss for our State Boards of Health to find out whether the candles generally sold contain, like the London ones, volatile poisonous substances, and what effects, if any, have been traced to the use of them; and, if there should be other well-authenticated cases of injury resulting from their use, to procure legislation forbidding their sale, and providing for the inspection of those manufactured or imported. Meanwhile, some chemist might do good by publishing a simple test by which poisonous articles of the kind could be readily detected with the appliances common to the average household.

AS the time approaches when it will be necessary to make and announce the final arrangements for the conduct of the examination for the *American Architect* Travelling-Scholarship, we desire to be definitely informed as to the names and addresses of those who propose to enter the competition. It is our intention to conduct the preliminary examination, at least, by mail, and if it should prove that most of those who are successful in passing the preliminary examination are stationed at a distance from Boston, and could only take part in a *viva voce* examination at considerable expense to themselves in the way of car fare and lodging, we shall endeavor to decide the competition entirely by means of the mail.

WE are grateful for the solicitude expressed by certain well-wishers who have inquired whether the recent change in the composition of the firm publishing this journal would in any way affect the usefulness and prosperity of the *American Architect*. We are pleased to say that the change of partnership is likely to tend to the benefit rather than to the prejudice of our supporters, as it is the purpose of Messrs. Ticknor & Company to henceforward devote themselves to the publication of technical rather than miscellaneous literature. Naturally, the tendency will be to extend the line of architectural books which will support and will gain support from this journal, and, as one thing helps another, we believe that the greater interest that is now to be devoted to this line of publication will enable us to make this journal of greater value, even than at present, to all classes of men who have an interest in building.

IT seems to be well settled now that the Nicaragua Canal will at least be begun, and there is a fair prospect that it may be completed, and become the only navigable short-cut between the Atlantic and Pacific Oceans. Notwithstanding the courage and generosity with which the French people have supported M. De Lesseps in the Panama scheme, it now appears certain that the enterprise will be abandoned. So long as any hope of its completion remained, the French journals spoke with natural disfavor of the competing canal at Nicaragua, but they now, so far as we can learn, have generally made up their minds that it would be folly to waste any more money in building a ship-canal over a mountain range, by means of locks which would apparently be dry most of the time, and regard the Nicaragua plan with much more equanimity than before. So far as the United States is concerned, the completion of the Nicaragua Canal, instead of that at Panama, is certainly very desirable. To a ship passing through the Panama cutting from the Pacific, Liverpool would be about as near as New York, and traffic would go to the port presenting the preponderance of advantages, which would undoubtedly be Liverpool. By the Nicaragua route, New York would be nearer, by a distance long enough to offer compensation for the advantages of docks and transhipment facilities existing at Liverpool, and the balance would be likely to incline toward our own ports in a great many cases; much to the advantage of our citizens, who, if they are forbidden to have any ships of their own, like to see their wharves occupied by foreign craft.

TO recapitulate, according to the most recent information, the comparative advantages of the Nicaragua and the Panama routes: the Nicaragua line, according to the surveys now determined upon, is one hundred and seventy miles long. This, of course, is something like five times the length of the Panama route, but the Nicaragua line has the immense advantage of possessing deep water at the highest level, while at Panama the locks by which the ridge of the Culebra must be crossed would have to be supplied artificially with water. At Nicaragua, the only excavation needed is at the ends of the canal, where low hills enclose a chain of lakes one hundred and fifty-two miles long, filled with water deep enough for navigation, and extending to within three miles of the Pacific Ocean on one side, and fifteen miles of the Atlantic on the other. By cutting through the hills a chain of locks will be formed, supplied with water from the lake at the summit, and vessels can easily climb the one hundred and seven feet of elevation which separates the lake from the oceans. Since the arrival of the colony of engineers which was sent out a year or more ago the final surveys have gone on rapidly, and a second working party is to sail from New York on the tenth of this month to begin the execution of the plans.

EQUESTRIAN MONUMENTS.[1] — XV.

THE CONDOTTIERI. — II.

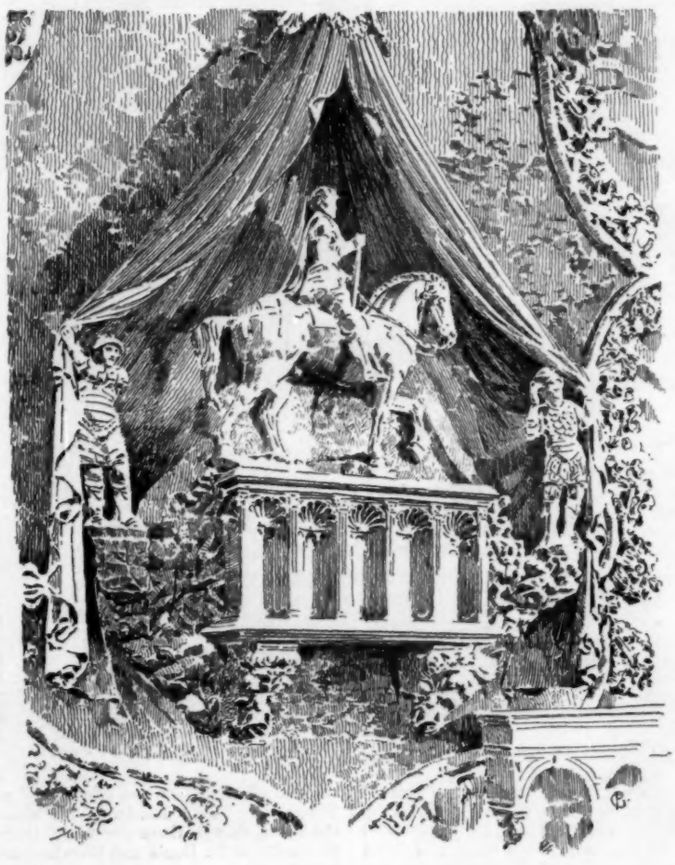
The King of Assyria in Battle. After Rene Menard's "*La Vie privée des Anciens.*"

THERE are two points to be observed while dealing with this period of continuous petty wars: the first is that the greater part of these struggles took place either before the invention of gunpowder or before firearms had come into general use, and hence the contending forces were more or less completely clad in armor, thanks to which the losses of the contestants were ludicrously small in comparison with the effort, and consequently the same men "lived to fight another day," — and many more after that. Thus at the battle of Anghiari — immortalized by Leonardo da Vinci in his famous cartoon the "Battle of the Standard" — which was an important engagement, the combined loss footed up one, a man-at-arms who tumbled off his horse, and being hampered by his heavy armor could not get onto his feet in time to escape being trampled to death. There was, however, enough bloodshed, but it was that of the non-combatant, the citizen who attempted to defend wife or daughter after a captured town had been turned over to the lust of the conquerors.[2]

The other fact, which has also a bearing on the singular immunity of the combatants, is that these battles were fought and seiges conducted by hirelings whose first care was their pay, and their next the ransom of their prisoners. So that where the battle was honestly waged the object was not to slay, but to capture for the sake of obtaining a ransom. Moreover, it was for the advantage of these mercenaries to prolong operations as much as possible, and at times there came to be a perfect understanding between the leaders, so that it was not an unusual thing for a besieging force to secretly introduce provisions into the beleagured place that it might not be captured too speedily, and the hired forces both inside the walls and out be in consequence out of a job. When the amount paid to these men is known, and when it is considered what pleasures gold could secure in those days, it is not to be wondered that their battles were waged with a view to prolonging their income: Federigo of Montefeltro — who afterward became the "good Duke of Urbino," — as captain-general of the Italian League was paid yearly 165,000 ducats, 45,000 of which were for his own purse, and while he served Alfonso of Naples, his pay was 8,000 ducats per month.

One of the acts that distinguished Federigo of Montefeltro as perhaps the most noble and humane member of his class, was his behavior during a time of famine, when the King of Naples and the Pope were making money by the monopoly they had established in corn. Federigo declared that he was not a merchant but merely a soldier, and that his only care was to save his people from hunger; accordingly he brought grain from Apulia and filled his storehouses that he might sell to his dependants at less cost than they could elsewhere procure the necessaries of life. It is worthy of note that attached to Duke Federigo's court, to which all the chivalry and learning of Italy flocked, were five architects and engineers.

Very different was the manner in which Bernabo Visconti treated his subjects while he ruled Milan. To help them save their hard-earned scudi was the last thing he thought of: on the contrary, one of his chiefest cares was how to empty their pockets into his own ever ravenous one. A very ingenious device which exemplifies the "heads I win; tails you lose" principle was at one time employed by him. He was a mighty sportsman and particularly fond of pig-sticking, and so kept large packs of boar-hounds, in all some 5,000 beasts: these he quartered on his unfortunate peasantry and then established a regular system of inspection; if the dogs were found to be thin and ill-kept, the man on whom they were billeted was punished and heavily fined; if they were too well-fed, fines and punishment followed equally; while if any had died, the unfortunate keeper was imprisoned and all his property was forfeited. Whatever the condition of the dogs might be, the condition of Bernabo's purse was always, through this ingenious device, found to be in good case. This was one of the mildest freaks of this interesting personage who was afflicted with a blood-thirst very similar to that of Ezzelino, and State criminals were by his orders subjected to torture during forty days — provided their endurance sustained them so long, and the greatest attention was lavished on them after one torture, that they might recuperate enough not to succumb to the next one.



Cortesio Sarego [or Sarengo], St. Anastasia at Verona.

The territory ruled over by the Visconti was at this time divided between Bernabo and his brother Galeazzo, to whose share his son, Gian Galeazzo, succeeded on his father's death. Then uncle and nephew each determined to obtain the other's portion and unite the territory under one head. The result of this common purpose was one of the usual family broils which add so much to the incident of Italian history. In it both force and craft were employed, the younger man mainly relying on the latter, and employing it most skilfully, the result being that Bernabo was led to believe that his nephew was but a poor creature; so when the latter, in 1385, pretended to make a pilgrimage to Our Lady of Varese, and in so doing passed near Milan, Bernabo and his sons came out to meet him without the protection of a large guard. As soon as Gian saw his uncle in his power he ordered his own guards to seize him, and at once Bernabo was hurried away to prison and served with a cup of cold poison in place of being flayed alive, after the fashion in which he had served many of his victims in their last disrobing in this life. So Gian ruled over all the possessions of the Visconti.

But although Bernabo Visconti was not a *condottiere* or a particularly illustrious person — morally speaking — his equestrian statue was wrought in 1354 and survives to us. It is one of the large class of sepulchral monuments, but, oddly enough, the tomb which it was made to adorn was not that of Bernabo, but of his wife, Regina della Scala, who in her lifetime had done what she might to soften the savage humors of her husband. The statue now stands in the Archæological Museum in the Brera at Milan, where its faded magnificence of gilding and color are not unfitting reminders of a vanished pomp, while the stern and rigid features of the Duke suggest the unyielding character of the man. The architectural character which the sculptor, Matteo [or Bonino] da Campione, has contrived to give to the horse, which suggests little of the grace of the real animal, is admirably adapted to the requirements of sepulchral sculpture, and adds

[1] Continued from page 191, No. 695.

[2] "After the four days' devastation of Piacenza, which Sforza was compelled to permit, the town stood empty, and at last had to be peopled by force." — Burkhardt's "*Renaissance in Italy.*"

not a little to the dignity of the monument. The tomb was placed originally behind the altar in San Giovanni in Conca, but because of the height of the monument the mounted figure appeared above the structure of the altar, and, consequently, worshippers had the air of addressing their petitions to the bloody human tyrant, rather than to the all-gracious Deity. This sort of thing could not be long endured after Bernabo's death, and it was soon after that event removed to a place near the door, and at a later day was transferred to its present resting-place, on the plea, perhaps, that secular, rather than religious, surroundings were most suited for it. The two figures which, like pages, stand on either hand, represent Fortitude and Justice.

The islands in the Adriatic to which some of the inhabitants of Padua, Vicenza, Verona and Treviso had fled in 452 to escape the hordes of Attila, had by slow degrees grown to be the mighty Venetian republic, ruled over by a doge — first elected in 697, the city itself being founded in 809. For a long time the interests of the Venetians lay rather in the Levant than in the Italian peninsula, and by reason of their position the inhabitants became a race of sailors, and because of their comparatively isolated position were able to develop mercantile pursuits somewhat rapidly; but the merchant fleets being exposed to the depredations of the pirates of the Adriatic and the Grecian Archipelago compelled the formation of a navy for the protection of their commerce and revenge upon the depredators. For centuries their operations were mainly in the East, and amongst other affairs they took a prominent part in the first crusade, sending a fleet of 200 vessels and taking part in the capture of Acre, Tyre, Sidon and Ascalon, and in 1198 their vessels were chartered by Fulk de Neuilly for another crusade. But finding themselves unable to pay the charter money the whilom crusaders in its stead offered the republic their services to aid in the recapture of the revolted city Zara, and the operations so begun were extended to an attack on Constantinople, which ended in the storm of the city in 1254, and the incidental transference to Venice of the horses of St. Mark's. During this period the republic of Genoa, in a corresponding position on the other side of Italy, had also developed into a maritime power of first importance and in the confined area to which the commerce of those days was restricted, it is not strange that disputes should arise between the Venetians and the Genoese which developed into great naval battles. These quarrels naturally engendered the making of alliances by one power or the other with some of the cities or States of Italy and, as a consequence, the struggles came to be carried on by land as well as by sea and Venice was at length as bitterly embroiled with its Italian neighbors as the non-amphibious cities of central Italy. As the sailor population of the Venetian republic were not accustomed to operations on dry land it became more necessary for them than for others to employ mercenaries, and because of the length of the republic's purse it was a very easy matter for them to command the services of the leading *condottieri* of the day, as for instance Francisco Carmagnola — who, being suspected by his employer Filippo Maria Visconti, was in consequence banished from Milan and immediately entered the service of Venice then at war with Milan, and was put at the head of the republic's army; but because he followed the habit of his kind and after a certain battle released his prisoners — his former companions in arms — he became suspected by his new employers and being decoyed back to the city on false pretexts was then accused of treason, thrown into prison, tortured and beheaded.

It is this employment of *condottieri* in the many campaigns in Italy that accounts for the presence in the Church of SS. Giovanni e Paolo at Venice, of several equestrian statues, a kind of monument seemingly having no connection with the ordinary pursuits of the citizens.

It is not necessary to suppose that these monuments are always evidence of the actual interment within the church of the bodies of the famous men they honor. In one case, at least, we know that a monument, that of Marc Antonio Bragadino [1596] marks the resting place not even of the ashes of this famous governor of Cyprus but merely of his skin. After a prolonged siege of Famagosta by the Turks, Bragadino surrendered after receiving a pledge of honorable treatment for himself and men: once in possession of the place the Turks disregarded their word, massacred the troops and, after ten days of varied and ingenious torture, flayed Bragadino alive and then stuffing his skin suspended the horrid effigy from the prow of the Turkish admiral's galley during the voyage back to Constantinople. Subsequently Bragadino's family purchased this trophy and enurned it at SS. Giovanni e Paolo. The monument erected to his memory was not of equestrian character, however. This church is to Venice much what Westminster Abbey is to London and rulers and leaders of every kind are here honored with monuments of many kinds, amongst which are the equestrian figure, in gilded wood, of Nicolo Orsini who led the armies of the Republic in the war with League of Cambray and died in 1510; one of Leonardo da Prato, a knight of Rhodes [1511], which so far as the photograph throws any light on it, may be also of wood; one of Pompeo Giustiniani [1616] by Franc Terilli and one of Orazio Baglioni [1617]. Besides these which sufficiently mark the amphibious character of the people, the church of Sta. Maria dei Frari contains the equestrian monument, which is surely of wood, of Paolo Savelli, a noted *condottiere* who fell in battle against Francesco de Carrara in 1405; while in the church of S. Stefano is a monument to one of the Contaniri which dates from the middle of the seventeenth century.

M C C C C L V I I I
QVO NEMO VTILIOR PATRIE NEC PACE NEC ARMIS
BENTIVOLE GENTIS HANIBAL HIC SITVS EST
EXPVLIT IS DVCVM POSSESSA EX VRBE TIRANNVM
ET PROFVGOS CIVES RESTITVIT PATRIE
A SVIS INGRATE SCELERATA MORTE PEREMPTVM
SED MERITVM SVMPSIT FACTO SVPPLICIVM
NAM SCELERIS TANTI AFFINIS NIC VNQ FVIT SET
HIC FERRO AVT FLAMA PREMIA DIGNA TVIT

Annibale Bentivoglio in the Church of S. Giacomo Maggiore, Bologna. From Litta's "*Famiglie celebri Italiane.*"

It is possible that art could have spared these monuments but history could not. The grim and dwarfish figure of Savelli on his big horse is worth pages of word-painting in helping the student to an understanding of how it was possible for the men of those days to do the soulless deeds with which they are credited. Perkins may speak of the "depth of degradation to which sacro-monumental art eventually fell" but he speaks as a student of art and not of history, and is quite as unwarranted in contemning the equestrian mural monuments for their want of "sacred" character as he would be in disparaging Stevens's Wellington in St. Paul's. The wrong in both cases rests not on the side of art but on the selection of a sacred edifice as a national Walhalla. These Italian mural monuments have no prototypes elsewhere, though there are mural tombs in Westminster Abbey, in St. Paul's, at St. Denis and elsewhere where the sculptured horse is introduced.

Although there are at Venice more of these equestrian sepulchral monuments than elsewhere, there are others belonging to the same class otherwheres in Italy, but only in the northern cities. One of these was — for it no longer exists — of somewhat unusual interest, and was notable for several things: first, because of an anecdotic or legendary interest, as it embodied in monumental form a real incident of the career of Pietro Farnese, a *condottiere* of the fourteenth century; next, because the equine portion of the group was half asinine — in reality, not in artistic merit; next, because the beast was one of the first of the large number of rearing steeds whose attitude too often serves as the point for unmeaning criticism; and, lastly, because of the material of which the monument was constructed.

Pietro Farnese — who afterwards died of a plague in 1363 — while engaged in battle with the Pisans, had his horse killed under him, and, as there happened to be no other steed within reach at the

moment, had to content himself with a sumpter mule which he seized, and continued to lead his troops to final victory. The incident was thought memorable enough to be commemorated, and Farnese's tomb was surmounted by a wooden group, covered with canvas, of Farnese and his humble steed, though the sculptor, who is variously thought to have been Jacopo Orcagna, Giuliano d'Arrigo, or Angelo Gaddi, felt obliged to disguise the hybrid character of the mount by throwing a hooded horse-cloth over it, and taking certain artistic license in the treatment of the tail. The statue existed until 1842,

Bernabo Visconti. Archæological Museum in the Brera, Milan.

when, during repairs on the Cathedral of Santa Maria del Fiore, the monument had to be displaced and the statue fell to pieces, and has never been restored.

Another rearing steed, in high relief this time, is the one that supports the figure of Annibale Bentivoglio on his tomb in the family chapel in the Church of S. Giacomo Maggiore at Bologna, which is believed to be the work of Niccolo da Bari, and belongs to the fifteenth century. This figure is life-size and colored. Of about the same date is the statue of Cortesio Sarego [or Sarengo] in the choir of the Church of S. Anastasia at Verona, which, in style, is closely allied to the equestrian tombs at Venice, and, as the sculptor's name is unknown, we are at liberty to assume that some Venetian sculptor driven into political exile had sought refuge at Verona. The isolation of the figure by means of the drawn-back curtains is certainly ingeniously devised, though the device is one that a sculptor of a later day might be expected to practise rather than a master in the fifteenth century.

The same upholsterer's motive was adopted in another monument, that of the Marquis Spinetta Malaspina in the Church of S. Giovanni

Monument to Pietro Farnese in the Cathedral, Florence. From Litta's "*Famiglie celebri Italiane.*"

in Sacco, also in Verona, though here the drapery has more the appearance of tent-folds, and less that of curtains. Why it should be that less store was set on this monument by the Italian authorities than on some others it is hard to say, but for some reason this work

Roberto Malatesta in the Louvre. From the *Gazette des Beaux-Arts.*

of art, such as it is, found its way into the market, and was bought by the South Kensington Museum authorities in 1888 for about $1,700 and removed to London, where it has been set up in the

Architectural Court. Unfortunately, the figure, more than life-size, which was executed in stucco or gesso, was badly broken in transit, though it was still within the power of skilful repairers to restore it to an almost perfect condition.

South Kensington is not the only museum, however, whose walls are graced by the equestrian figure of an Italian *condottiere*. The Louvre, too, has its specimen, intrinsically, a more valuable one in that it is the work of Paolo Romano, which represents one of the typical *condottiere* of the fifteenth century, a member of the hated family of the Malatesta of Rimini. Roberto Malatesta was an

Leonardo da Prato in S. Giovanni e Paolo, Venice.

illegitimate son of Sigismund, Lord of Rimini, and at his father's death took the usual steps to secure the succession for himself. Deceitful diplomacy, poison and cold steel prevailed, and once firmly settled with the aid of the Duke of Urbino, whose daughter he afterward espoused, he overcame the papal troops of Paul II, who, for State reasons, upheld the cause of the legitimate heirs. Later, under another pope, he became himself commander of the papal forces, and rendered such good service that when he succumbed to poison, as usual, in 1482, he was buried in the vaults of St. Peter's, and an equestrian bas-relief — which was to be one of a series commemorating the services of the captains-general of the pontifical troops — was executed at the command of Sixtus IV, by Paolo Romano. [Recent German research shows that this attribution of the work to Paolo Romano is a mistake.] In 1619 this bas-relief was removed to the Villa Borghese, and there set up, but it was afterwards displaced and thrown aside. In its neglected state, it at length caught the eye of the Inspector of Fine Arts for the French Government, who succeeded in buying it for the Louvre from Prince Borghese.

In the Church of San Giuseppe at Aquila is a tomb by a German sculptor Walter Alemanno, whereon the equestrian figure of Ludovico Camponeschi keeps watch and ward over the recumbent figure of his father, Count Lalle, Lord of Aquila. The work, which was erected in 1432, is said to be coarse in execution though the general effect is good.

Bernabo Visconti. — Born in 1319; became master of Bergamo, Brescia, Crema and Cremona. He also ruled Milan conjointly with Galeazzo. He was notorious for his cruelty and audacity, and defied the power of the Pope, who excommunicated him. Urban V preached a crusade against him, and united the Emperor Charles IV with other monarchs in a league against him about 1363. Bernabo, however, resisted them with success. He died in 1385, having been murdered by his nephew, Gian Galeazzo, who succeeded him.

Annibale Bentivoglio. — Lord of Bologna, died in 1458.

Niccolo da Bari. — Born in Bari, in Apulia, in or about 1414, and died at Bologna in 1494 or 1495. He was a follower of Jacopo della Quercia, and is often

Paolo Savelli in S. Maria dei Frari, Venice.

called Niccolo dell'Arca from his work on the *arca* or sarcophagus of St. Domenick, in the Church of St. Domenick, at Bologna. He spent the greater part of his life at Bologna.

Paolo Savelli. — Killed in 1405, in a battle against Francesco de Carrara.

Niccolo Orsini. — Count of Pittigliano, a general in the Venetian army, 1510.

Pietro Farnese. — Died in 1363.

Roberto Malatesta. — Styled "The Magnificent." Born 1442; died 1482.

Cortesio Sarego. — Brother-in-law and general to Antonio della Scala.

Paolo Romano. — Flourished in the first half of the fifteenth century, and in the latter part of it he retired from the world and spent his remaining days in solitude and peace. "We are told by Antonio Filarete, in his manuscript architectural treatise, that Paolo was a goldsmith, as well as a sculptor, and that he helped to make the silver statues of the twelve apostles for the altar of St. Peter's, which were destroyed in the sack of 1527." His other works in Rome are a statue of St. Paul on the Ponte Sant' Angelo, the tomb of Bartolomeo Carafa, in the Church of the Knights of Malta, that of Cardinal Stefaneschi, at Santo Maria, in Trastevere, and (probably) that of Cardinal Philippe d'Alençon in the same church. "Vasari speaks of a highly-praised statue of an armed man on horseback, by Paolo Romano at St. Peter's, and the epitaph placed upon Paolo's tomb mentions his statue of Cupid."

The Condottieri as Patrons of Art. — "There is nothing more curious in the history of Italy in the fifteenth century, than to see truculent soldiers, known as faithless leaders of armies, or guilty perpetrators of dreadful crimes, spending the fruit of their depredations on the erection of sacred edifices, and employing not only the best architects of the world to plan and erect, but great painters to adorn." — From Crowe and Cavalcaselle's "*History of Painting in Italy.*"

Bloodshed in Italian Wars. — "Sabellico talks of much bloodshed (in the battle of Maclodio) but it would seem to have been the innocent blood of horses that alone was shed in this great battle. 'Those who were there' (says Bigli) 'affirm that they heard of no one being killed, extraordinary to relate, though it was a great battle. Philip's army was so completely equipped in armor that no small blow was needed to injure them; nor is there any man who can record what could be called a slaughter of armed men in Italy, though the slaughter of horses was incredible.'" — From Mrs. Oliphant's "*Makers of Venice.*"

"Instances of this are very frequent. Thus at the action of Zagonara, in 1423, but three persons, according to Machiavelli, lost their lives, and those by suffocation in the mud. At that of Molinella, in 1467, he says that no one was killed. Ammirato reproves him for this, as all the authors of the time represent it to have been sanguinary, and insinuates that Machiavelli ridicules the inoffensiveness of those armies more than it deserves. Certainly some few battles of the fifteenth century were not only obstinately contested, but attended with considerable loss. But, in general, the slaughter must appear very trifling. Ammirato

himself says, that in an action between the Neapolitan and Papal troops in 1486, which lasted all day, not only no one was killed but it is not recorded that any one was wounded. Guicciardini's general testimony to the character of these combats is unequivocal. He speaks of the battle of Fornova between the confederates of Lombardy and the army of Charles VIII returning from Naples in 1495, as very remarkable on account of the slaughter, which amounted on the Italian side to 3,000 men." — From Hallam's "*Middle Ages.*"

[To be continued.]

THE ILLUSTRATIONS

[*Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.*]

ENTRANCE TO THE COMMERCIAL BANK BUILDING, ALBANY, N. Y. MR. R. W. GIBSON, ARCHITECT, NEW YORK, N. Y.

[Gelatine Print, issued only with the Imperial Edition.]

ARMORY, WORCESTER, MASS. MESSRS. FULLER & DELANO, ARCHITECTS, WORCESTER, MASS.

WE reprint here the description of this building which by accident was printed in last week's issue.

THE new building, which is to occupy the lot at the intersection of Grove and Salisbury Streets, facing Lincoln Square, is to be built of brick with brownstone trimmings, and is to be 67 by 85 feet, four stories in height. The second and third floors of the head-house will be for the use of the infantry companies. Each floor will contain two company rooms, 26 by 27 feet, the commissioned officers' rooms occupying the projecting bays at the front, while the rooms for the non-commissioned officers open from the rear. Each company will be provided with all the necessary rooms for uniforms, guns, dressing, etc., on the same floor. The fourth floor is occupied by a kitchen, 15 by 17, a large mess-hall, 27 by 44 feet, with band and drum-corps rooms at the front and a room for a gymnasium at the rear. The basement will be fitted up with dressing-rooms, harness-rooms, lavatories, boiler-rooms, armorer's-room, etc., while the basement under the drill-shed will be used as a magazine. A well-equipped rifle-range, extending through the basements of the head-house and drill-shed, giving a distance of at least 200 feet, will be one of the features of the new armory. At the rear of the head-house, and connected with it, is the drill-shed, a partial view of which is given in the cut. This will be only one story high, 75 feet wide, and will extend back from the head-house 160 feet. The roof will be supported by iron arch trusses rising from the floor, which will be entirely unobstructed by pillars or partitions, thus affording an excellent place for drill. A small section, 16 feet wide, will be shut off from the rear end of the shed as a gun park for the artillery. This section is separated from the main hall by gates, which may be raised up out of the way. The entrance to the drill-shed for the artillery will be in the centre of the Salisbury Street side, and the rear corners of the shed will be bastioned and furnished with loop-holes, commanding the sides and rear of the building in case of need. The floors throughout the building will be of hard wood, and the finish will be generally in oak.

EQUESTRIAN MONUMENT TO SPINETTA MALASPINA.

SEE article on "Equestrian Monuments," elsewhere in this issue.

EQUESTRIAN MONUMENT TO NICCOLO ORSINI.

SEE article on "Equestrian Monuments," elsewhere in this issue.

THE TECHNISCHE HOCHSCHULE, BERLIN, GERMANY.

SEE article elsewhere in this issue.

HOUSE FOR W. C. PROCTER, ESQ., CINCINNATI, O. MR. H. NEILL WILSON, ARCHITECT, PITTSFIELD, MASS.

THE NEW GATEWAY FOR HARVARD COLLEGE, CAMBRIDGE, MASS. MESSRS. MCKIM, MEAD & WHITE, ARCHITECTS, NEW YORK, N. Y.

A KEG OF NAILS.— A Hartford lady tells this true relation concerning her ancestor, who was a direct descendant of John Eliot, the great missionary and scholar. This lady lived in New Haven, and had occasion to send to Boston for a number of kegs of nails, New Haven at that time (about 1765) not producing these necessaries. In due time the kegs arrived, and, on opening them, it was discovered that one was filled with Spanish dollars. The family wrote to the Boston merchant, telling him that one of the kegs held something more valuable than nails. He replied that he had bought them for nails, and his responsibility therewith ended. Well, they were kept among the family treasures for many years untouched and unclaimed until the death of the head of the house, who, in her will, ordered that they be melted and cast into a communion-service for the New Haven Church, which was done, and it is still probably in use. — *Hartford Courant.*

THE TECHNISCHE HOCHSCHULE OF BERLIN.

PROBABLY no other technological educational institution in the world can show a home so palatially beautiful in the grandeur, extent, and site of its buildings as the new quarters of the Technische Hochschule, or Technical High School, of Berlin. The location is a remarkably attractive one, in the suburban city of Charlottenburg. The main buildings front on the great avenue which runs from the Charlottenburg Gate, in Berlin, straight out through the noble old park, the Thiergarten. The grounds comprise a large area, triangular in general shape, and charmingly treated in a park-like style, formal in front but more natural in design at the rear, with paths, trees and shrubbery combining to make a delightful strolling ground for the students. Besides the enormous main building, there is a large and handsome structure devoted entirely to the chemical laboratory, and, standing apart from each other and the other edifices, in the rear, is the building of the technical experimental station and another for the boilers and engines, with the usual tall chimney.

The first sight of the main building, of cheerful creamy-colored stone and its wealth of decoration well-balanced by the uniformity of the long wings connecting the prominent ornamental portions, gives an impression of well-combined richness and simplicity. The unity of the structure, in spite of its great length of 226.66 metres and its uniformity of height, has been admirably maintained. The end-sections are brought forward, forming a half-enclosed great open court in front. The attention is first caught by the conspicuous decorative work enriching these end-sections and is then carried by the graceful repetitions of the long intervening portions of the edifice to the architectural focus of the composition, the central section with the grand entrance, where the whole design blossoms into a beautiful expression of structural dignity supported by an elaboration of sculpture in the shape of statuary, panels of reliefs, medallions and more conventional stone-carving. The contrast of the light color of the stone with the clear, luminous shadows of the harmoniously accented recesses effectively heighten the working of the sculpture. The dominance of this central section is assured mainly by this concentration of decoration. In height it rises but a few feet above the rest of the building, and the quiet emphasis thus given is just sufficient to serve its purpose, without giving an impression of a restless self-assertion. As it is, the effect is that of majestic tranquility. The dignity of the façade is also much enhanced by the design of the approach to the entrance, the broad driveway and walks ascending by a slight grade to a beautiful low terrace, while the broad steps descend directly to the street in a series of three short divisions, across a central depressed space with two fountains.

The sculpture of the exterior is by several of the leading German artists, and its beauty testifies to the high rank in plastic art occupied by Germany to-day. Two niches, on the right and left of the main story of the central section, are occupied by statues of Schlüter and Leonardo da Vinci, and corresponding niches in the terminal sections of the great façades by statues of Bramante and Erwin on the east, and Stephenson and James Watt on the west. The sculptors of these are Hundtrieser, Eberlein, Encke and Keil, who also designed the allegorical reliefs crowning the arches of the niches. The central section has also five busts carried on postaments interrupting the balustrade of the main story, between the columns. These are the work of Karl Begas, and represent five masters of art and industrial technique, Gauss, Eytelwein, Schinkel, Redtenbacher and Liebig. Five sculptors shared in the creation of the eighteen gigantic figures that form so prominent a feature of the front and sides of the attic of the central section, Reusch, Hartzer, Herter, Eberlein and Schüler. These figures depict each some branch of architectural or technical handwork, and the idea thus embodied, of illustrating the practical side of technical work, is further carried out in the great reliefs occupying the broad spaces between these figures. These rich compositions are by Otto Lessing. They represent various events in artistic and architectural activity, ending with an illustration of a festival in honor of the completion of a house. The terminal sections of the north façade and the central section of the south façade are crowned with statuary allegorically depicting the sciences, arts and industries, such as astronomy, optics, geometry, art-history, painting, sculpture, commerce, mechanical construction, railway construction, etc. The sculptors of these are Lürssen, Franz, Karl Begas, Moser, Dorn and Schultz. The ornamental sculpture of the façades was designed by Otto Lessing and C. Dankberg.

The talented architects Messrs. Lucae and Hitzig have created an interior worthy of the noble exterior. Color is here a leading element in the effect, working by means of the natural hues of the

materials used, as well as by frescos and colored glass. The coloring is richly reinforced by the use of beautifully executed stucco-work, particularly in the splendidly ornamented rooms for general intercourse, such as the entrance hall, the grand central hall, the stairways and the corridors. As to the impression produced by the interior, I can do no better than quote from a scholarly criticism that appeared in the *Centralblatt der Bauverwaltung:* "In the first degree, on entering, one is fascinated and captivated by the purely architectural effect of these various rooms that unite themselves as one. Adjustment, proportion and apportionment are everywhere so happily dealt with, that in this respect the work has reached the full height attainable with the resources of to-day. The variation in the treatment of the single features of this whole, the combination of the same with each other, and the heightening of expression thereby gained, as well as the perfect designing of all details, betray at the first glance that the creation of mature masters stands before one. The vistas opened out from the grand central hall into the surrounding galleries, from the galleries into the hall, and from the stairways into the hall and into the galleries, are enchanting in the extreme."

As to color, the entrance-hall is kept low in tone; the rest of the interior is maintained in soft, light hues. In the entrance-hall dark granite columns, with bases and capitals of bronze, support a vaulted ceiling with stucco decorations on a strong blue ground. The marble steps leading from this hall into the inner rooms are flanked by two bronze sphynxs modelled by Brütt. The grand central hall comes next, formed by a great court roofed with glass, and it makes a noble impression. The architectural features are here preserved in the light tones of the natural stone. The broad surfaces of the piers in the ground story are painted in tapestry designs and above the arches of these piers are female figures representing various activities of art, construction and technique, supported by boy figures. These symbolize the various branches of instruction taught in the building. The figures are in monochrome, light gray on a yellow ground, and are by M. von Beckerath. In the two stories above stand double rows of dark granite columns, standing in pairs, one behind the other; their bases and capitals imitate bronze, the spaces above the arches are painted in yellow and gray, with medallions, one series composed of the faces of artists, and the other of the arms and names of leading German cities; the ground-work of these is blue. The skylight is composed, in its main surface, of green glass, leaded in appropriate patterns; the surrounding frieze is composed of a glass mosaic of brilliant colors. From the centre there hangs a great sun-burner of decorative design. The vaulted ceilings of the galleries surrounding the hall are painted in two alternating colors. The grand stairways are splendid with columns of granite and marble, balustrades of bronze with fields of wrought-ironwork, and vaulted ceilings of basket-arches with handsome stucco-work. There are some handsome groups of statuary in the grand central hall, including the bronzed cast of the figure of Beuth made by Rauch, and that of Schinkel by Wiese, for the monument at Neurippin.

Another splendid room is the aula, or grand auditorium. The walls are divided by pilasters of stucco beautifully counterfeiting red marble, and animated colors predominate on the walls and ceiling. Surrounding the hall, in the fields of the arches occupying the upper portion of the walls, there are nine architectural paintings by Spangenberg, Jacob and Körner, representing famous architectural monuments of successive periods: the Parthenon and Acropolis at Athens, the Ruins of Pæstum, San Apollinare in Classe near Ravenna, the church at Laach, the Elizabeth Church at Marburg, the Marienburg in West Prussia, St. Peter's and the Arch of Titus in Rome, and the ruins of Philæ.

The rich collections of the institution, consisting of casts, models, drawings, etc., belonging to the various departments of technical activity, form a large and instructive museum. Several rooms are devoted to the "Schinkel Museum," containing a large collection of the drawings and models illustrating the manifold works of that great and versatile architect. By the way, would not a Richardson museum on a similar plan be an admirable feature of the Massachusetts Institute of Technology?

The corridors are largely occupied by the rich collection of ornamental casts from the former Bauakademie and the Gewerbeakademie. It is divided into sections representing respectively the Greek, Roman, Byzantine, Moorish, Romanesque, Gothic and Renaissance periods.

The great building encloses four open courts of comparatively simple architecture, their walls in yellow and brownish brick, with details of sandstone and bands of sgraffito, partly decorative and partly with figures, the former work by Essdorf and the latter by Otto Lessing.

The chemical laboratory has a handsome exterior, harmonizing with that of the main building, but not so elaborate. The interior is plain, but admirably adapted to its purpose of affording the best possible opportunities for the most thorough instruction and investigation in all branches of the science. Among the interesting objects to be seen here is a collection of the work by Professor Vogel, the famous expert and experimenter in photography, who is at the head of the photographic department.

The Technische Hochschule was formed in 1879 by the union of the Bauakademie and the Gewerbeakademie, or, in English, the Academy of Construction and the Academy of Industry. The origin of the former antedates the latter by over a century, for in 1699 the Prince Elector of Brandenburg, Frederic III, founded the Academy of Arts, comprising instruction in architecture as well as in painting and sculpture. Since, however, architecture could find little consideration in such an institution except as a fine art, and its technical aspects were neglected, it was found desirable to establish a separate institution, and on March 18, 1799, King Frederic William III authorized the establishment of the Bauakademie with its declared objects consisting of "the theoretical and practical education of able surveyors, civil and hydraulic engineers, and also handworkers for building, chiefly for the royal states, although foreigners may be admitted in so far as it may occur without detriment to the interests of natives." The course of instruction embraced twenty-three separate studies at the start. It was required that the students should visit the royal edifices of the city under the guidance of a teacher in order to receive practical illustration of their studies. The minimum age for architectural students was fifteen years. The requirements for entrance were a good readable handwriting and an orthographically correct composition, a fundamental knowledge of Latin and French, and a ready knowledge of the arithmetical principles necessary in common life. The term for students of surveying was a year and a half, for students of architecture, two years and a half. This was the first institution of the kind in Germany, and, with the exception of the Ecole Polytechnique, founded in Paris in 1794, the first in Europe. In 1801 the number of students was fifty-nine, including eleven foreigners. The institution first occupied the upper story of the Mint, and in 1832 the erection of a special building on the Werderschen-Markt was begun after a design by Schinkel, in brick.

A word about the origin of the Gewerbeakademie. After the examples of the Polytechnic Institutes established in Prague in 1806, and in Vienna in 1815, Prussia founded in 1821 the "Technische Schule" in Berlin — an institution quite different from that understood under the word "Polytechnicum" to-day. The age for admission was from twelve to fifteen years. The instruction for the lower classes consisted of geometry, arithmetic, natural philosophy, drawing and, for some, modelling. For the upper class, arithmetic and algebra, geometry, stereotomy, perspective, trigonometry, statics and mechanics, mechanical construction and technology, and theoretical chemistry. A mechanical workshop was early connected with the institution. In 1827 its name was changed to Gewerbe-Institut, and in 1866 it was again changed to Gewerbe-Akademie.

In 1876 the union of the two institutions was decided upon under the name of "Die Königliche Technische Hochschule zu Berlin," or the Royal Technical High-School of Berlin. The preparations were not completed until 1879, from which time the present magnificent institution dates its foundation. The rules of the institution require for the admission of a German the presentation of a certificate of graduation from a German gymnasium or Prussian real-gymnasium (real-school of the first degree) or a Prussian upper real-school (industrial school with a nine years' course and two foreign languages). There are five departments: architecture, civil engineering, mechanical engineering, including ship-building, chemistry and mining, and a general scientific course, with mathematics and natural science in particular. The various courses have no binding force for the students, but are designed to serve as a guide for them in obtaining the instruction they desire. As in the universities of Germany, so in the Technical High-School, or, more correctly, University — *hochschule* and *universität* being synonymous in German — there is complete freedom of study, every student being at perfect liberty to study how, when or what he may choose, the entire responsibility being placed upon him as to whether he shall take advantage of the opportunities so freely set at his disposal. The German system is known by its fruits, and by these it may be judged whether the custom of regarding the student as a responsible man is not superior to the English and American custom of continuing the school-boy and school-master policy into the higher seats of learning.

The government of the institution consists of a rector and senate, and a "syndicus" for the administration of the financial affairs. Each department forms an independent entity, with its internal affairs administered by a chairman and the members of its faculty. The rector is elected every year by the collective faculties, the choice being formally ratified by the King. The students have, also, the privilege of attendance at the lectures of the University of Berlin.

The splendid buildings at Charlottenburg were finished in 1884, and dedicated with elaborate ceremonies and festivities on November 1 and 2 of that year. Their cost was 8,150,000 marks, or over $2,000,000. To duplicate them in this country, it would probably require at least considerably more than double that sum.

In the winter of 1885–86 there were 662 regular students and 368 "*Hospitanten*," or unmatriculated students, making a total of 1,030. The present total number is something like 1,200. The instruction-corps consists of regularly appointed professors, named by the King "*Docenten*" and "*Privat docenten*," or instructors and unofficial instructors. The latest statistics gave the number of professors and instructors as 57, and of unofficial instructors as 24. There is a considerable number of stipendiums, or scholarships, provided by the State, and also by the provinces, municipalities, various schools, and private individuals, mostly consisting of sums of 600 marks annually, and with other amounts from 300 marks upwards. Most of the scholarships also carry the privilege of freedom from the payment of instruction-fees, and, moreover, six per cent of the students are also absolved from the same. The Louis Boissonet scholarship for

architects and civil engineers yields an annual income of something like 3,000 marks, or about $750, which is annually given alternately to an architect and a civil engineer who have received the greater part of their training at the institution, in very much the same manner as the Rotch scholarship here; that is, with the condition that the recipient shall use the money in undertaking a journey connected with a professional task, and shall submit a report concerning the same. There are also two travelling-scholarships of 1,500 marks each for students of Divisions III and IV, respectively, mechanical engineering and ship-building, and chemistry and mining, who have distinguished themselves at their diploma-examination. From the income of the Von Seydlitz scholarship-fund — a sum annually fixed by the Curator — at present about 2,300 marks, is awarded as a prize to a student of one of the aforementioned two divisions who, in the diploma-examinations of the previous year, has specially distinguished himself. For each division, and also the ship-building section, a prize-problem is set, with 300 marks and a silver medal for the best solution, and a silver prize-medal for the second-best solution.

The Technische Hochschule includes the following collections and institutes:

The Physical Collection, containing all the apparatus necessary in the courses on experimental physics, and is particularly rich in instruments relating to optics and electricity.

The Kinematic Collection contains 590 models, comprised in two divisions, one illustrating the control of motion, and the other the transmission of motion.

The Electro-technical Laboratory affords the students an opportunity to familiarize themselves with the practice of electrical measurements.

The Geodetic Collection is devoted exclusively to means for instruction.

The Mineralogical Institute comprises, besides its lecture-halls, the laboratory for crystallographic-physical and chemic-mineralogical researches, a mineralogical collection for instruction, a geological collection for instruction, and the mineralogical museum.

The Chemical Laboratory comprises a laboratory for inorganic chemistry, another for organic chemistry, a metallurgical laboratory, a laboratory for technical chemistry, and a photochemical laboratory.

The Royal Mechanic-technical Experimental Institution is designed for the testing of all materials used in technical work, with the exception of specifically building materials. Among the apparatus are two testing-machines of the Werder & Martens pattern, with a power of 100,000 and 50,000 kilogrammes respectively. Among the great tasks now in hand are an investigation of railway material at a cost of about 60,000 marks, the experiments lasting about two and a half years, and an investigation of the native woods of Prussia, the cost of the preliminary experiments being about 4,000 marks; both of these are carried on in behalf of the Ministry of Public Works. In behalf of the Ministry of Commerce there is being conducted an investigation of the products of the German and foreign wire-manufacturing industries, lasting about two years, and costing about 4,000 marks; and an investigation of German and foreign lubricating oils, at a cost of about 3,500 marks for preliminary experiments. There are also various scientific investigations in hand in the interest of societies and of the institution itself, such as the conduct of plastic masses under pressure on all sides, the sweating of powder-form substances under high pressure, microscopic investigations of structural changes in metals under tests of strength, etc.

The Royal Testing-station for Building Materials was established in 1871, particularly for the purpose of deciding disputes concerning the worth of cements. The station has apparatus for testing the strength and other physical properties of burnt and unburnt artificial stones. The hydraulic press can exert a power of 14,000 kilogrammes. Among the means for testing cements are sieves with 600, 900 and 5,000 meshes to the square-centimeter.

SYLVESTER BAXTER.

THE ELECTRICAL TREATMENT OF SEWAGE.

THERE is a universal consensus of opinion in large towns, and in a good many small ones too, that "something must be done" with the sewage other than turning it into the nearest stream. In many places "something" has been done; the results have always been costly, and we have yet to learn that they have ever been quite satisfactory. In the metropolis vast sums have been spent and are still being laid out upon works for carrying on the precipitation process introduced by Mr. W. J. Dibdin, the chemist to the late Board of Works. This process consists in the precipitation of the solids in the sewage by the addition of 3.7 grains of lime and one grain of sulphate of iron to each gallon of fluid. By this means the matter in suspension is precipitated as mud; the clear liquid is allowed to flow into the river, while the sludge is carried out to sea by steamers and deposited in deep water. There are plenty of chemists who do not hesitate to declare positively that these quantities of chemicals are quite insufficient to produce a satisfactory effluent, and that if they are not increased the condition of the Thames will undergo no amelioration. Experience only can decide this point; the works are being built and the exact method to be followed remains to be determined. It is to the interest of Londoners that the river should be rescued from its present state of filth, and that it should be done as cheaply as is compatible with efficiency.

Among the many processes of sewage purification which are being offered for adoption at the new works by the London County Council, none appears to be more promising than that of Mr. William Webster, of 8 St. Martin's-place, Trafalgar-square. An experimental plant, capable of treating 1,000,000 gallons of sewage per day, has been erected at Mr. Webster's expense, at the South Metropolitan outfall of Crossness, and for more than twelve months trials have been conducted there on a scale corresponding to the requirements of a fair-sized town. These trials have certainly demonstrated the efficacy of the process, and so far as their size and intermittent character would permit, they have shown it to be economical. The method followed is to electrolyse the sewage between iron electrodes. The chemical reactions have not yet been very clearly ascertained, but the nascent chlorine and the oxygen are carried to the positive electrode, probably in the form of hypochlorous acid, the strongest disinfectant known, and there they rapidly oxidize the organic matter. The iron is also disolved as a hypochlorite, and combining with the suspended matter, coagulates it in flocculent particles. These are buoyed up by the hydrogen bubbles, and rise to the top as froth, leaving clear liquid beneath. If the treated sewage be run into a tank and allowed to remain there for two hours, the hydrogen gradually disengages itself, whereupon the coagulated particles subside to the bottom as sludge, and the liquid can be run off. It is found on analysis that the amount of iron disolved is equal to 2 grains per gallon treated. The matter in suspension, as shown by the following Table, is nearly all removed, while the free ammonia and albumenoid matter are very sensibly reduced. Any one may try the experiment for himself in a beaker glass with a sample of sewerage, and a pair of iron electrodes having a difference of potential of 2½ volts; in a very few minutes the organic matter is rendered flocculent, and an hour sees it precipitated.

THE ELECTRICAL TREATMENT OF SEWAGE. — ANALYSES OF EXPERIMENTS, 1888-9. PARTS PER 100,000.

—	Appearance.	Odor.	Nitrogen as		Chlorine as Chlorides.	Oxygen required to Oxidize Organic Matter.	Suspended Matters.		
			Free Ammonia.	Albuminoid Matter.			Total.	Mineral.	Organic
(A)	Raw sewage, very turbid & opalescent	Bad	3.57	0.6	14.61	4.03	14.52	5.95	8.57
	Effluent, clear....	None	2.9	0.28	13.39	1.34	1.48	1.05	0.43
(A)	Raw sewage, very turbid & opalescent	Very bad	1.89	0.54	29.5	2.57	15.43	7.43	8.00
	Effluent, clear....	None	1.8	0.24	29.0	1.21	2.20	1.91	0.29
Average of 20 analyses	Raw sewage, very turbid & opalescent	Slight	4.34	0.5	21.64	1.24	33.35	not estimated.	
	Effluent, clear....	None	3.22	0.2	18.62	0.52	1.56	not estimated.	

(A) Time of settlement one hour in open reservoirs.

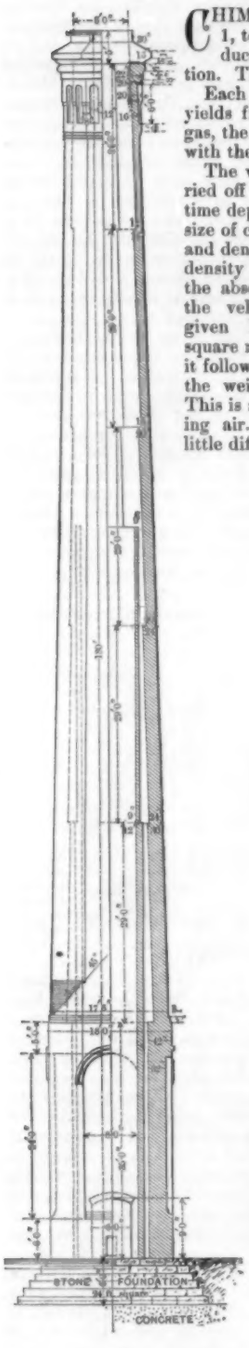
At Mr. Webster's works the raw sewage, as it is received from London, is lifted into a tank, from which it flows through a long inclined channel to a settling reservoir. In this channel there are a large number of iron plates arranged in groups. All the plates in each group are parallel to each other and to the sides of the channel, the sewage flowing between them in streams about an inch wide and the depth of the channel. The plates are alternately positive and negative, the difference of potential being 2½ volts. The dynamo delivers current at a pressure of 20 volts, and six groups of plates are arranged in series. The time a particle of sewage is occupied in passing through the entire length of the channel varies, according to the degree of its pollution, from two to ten minutes. It is estimated that on the average it requires .25 ampère hour of current for each gallon treated, the current density being 1 ampère per 11 square feet of electrode.

No positive estimates of cost have yet been made. The sole working expenses are for coal, iron and labor; and it is calculated that these will amount to 13*s.* per million gallons of London sewage, if treated on a large scale. Interest and depreciation of plant have to be added to this, and all the labor of dealing with the sludge. According to the Metropolitan Board of Works, it costs 6*d.* per ton to discharge this into the sea and about 1*s.* 6*d.* per ton to press it. In a town of 333,000, having a sewage discharge of 30 gallons per head, the mechanical power required is estimated at 264 horse-power and the expenditure of iron at 464 tons per annum. This latter is in the form of plates, 1 inch thick, run directly from the blast furnace.

There is a charming simplicity about Mr. Webster's process. He manufactures his chemicals to a great extent out of the sewage itself, and he uses them in the nascent state where it is well-known they are most powerful. Instead of adding 5, 10, 12, or 15 grains per gallon of solid matter, as is now done, he only adds two, and he not only precipitates the matters in suspension, but he also removes some of the organic matter in solution. This latter is an important matter, as it defers the second decomposition so long that the effluent may be

carried down to the sea, or oxidized by natural influences, before it can occur. The extent to which the purification can be carried is merely a matter of time, and in hot weather, when the quantity of sewage is reduced, and is consequently fouler, it can be allowed to remain for a longer period in the electrolytic bath. — *Engineering.*

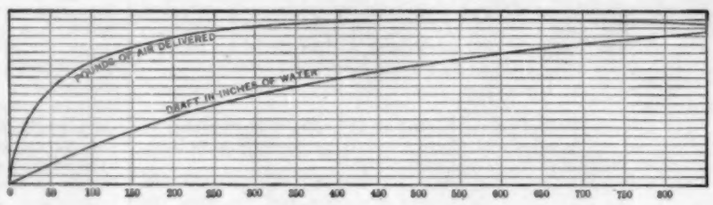
CHIMNEYS.[1]



CHIMNEYS are required for two purposes: 1, to carry off obnoxious gases; 2, to produce a draught, and so facilitate combustion. The first requires size, the second height.

Each pound of coal burned yields from 13 to 30 pounds of gas, the volume of which varies with the temperature.

The weight of gas to be carried off by a chimney in a given time depends upon three things: size of chimney, velocity of flow and density of gas. But as the density decreases directly as the absolute temperature, while the velocity increases with a given height, nearly as the square root of the temperature, it follows that there is a temperature at which the weight of gas delivered is a maximum. This is about 550 degrees above the surrounding air. Temperature, however, makes so little difference, that at 550 degrees above, the quantity is *only four per cent* greater than at 300 degrees. Therefore, height and area are the only elements necessary to consider in an ordinary chimney.



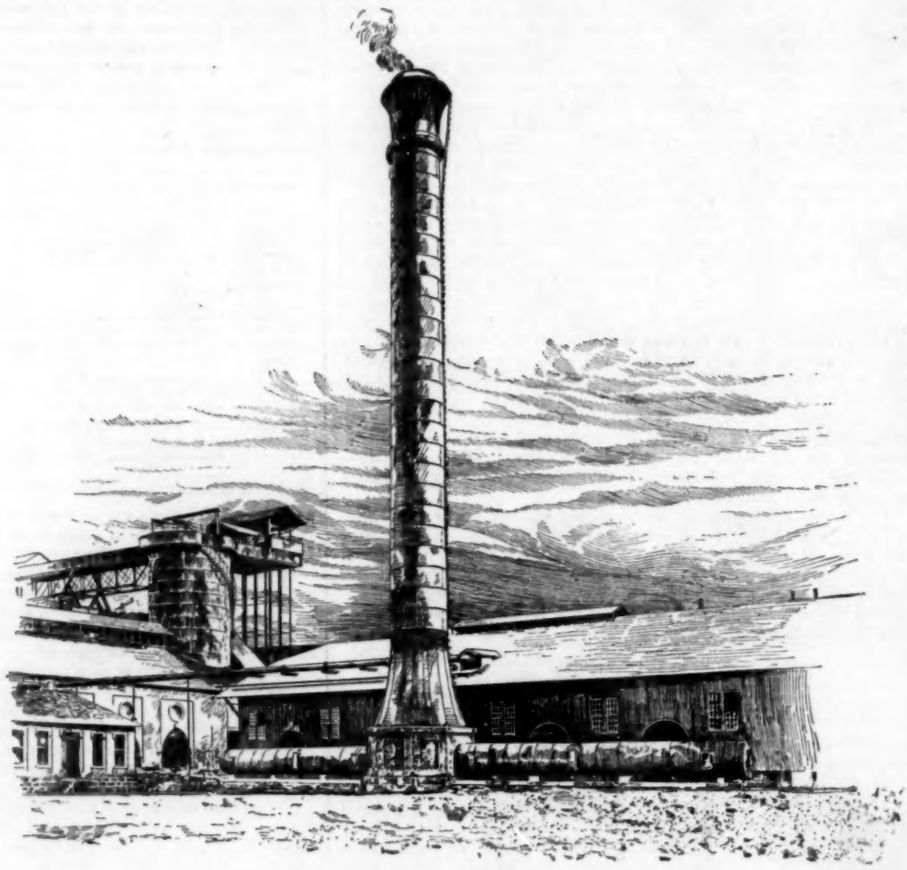
The intensity of draught is, however, independent of the size, and depends upon the difference in weight of the outside and inside columns of air, which varies nearly as the product of the height into the difference of temperature. This is usually stated in an equivalent column of water, and may vary from 0 to possibly 2 inches.

After a height has been reached to produce draught of sufficient intensity to burn fine, hard coal, provided the area of the chimney is large enough, there seems no good mechanical reason for adding further to the height, whatever the size of the chimney required. Where cost is no consideration there is no objection to building as high as one pleases; but for the purely utilitarian purpose of steam-making, equally good results might be attained with a shorter chimney at much less cost.

The intensity of draught required varies with the kind and condition of the fuel, and the thickness of the fires. Wood requires the least, and fine coal or slack the most. To burn anthracite slack to advantage, a draught of $1\frac{1}{4}$ inch of water is necessary, which can be attained by a well-proportioned chimney 175 feet high.

Generally a much less height than 100 feet cannot be recommended for a boiler, as the lower grades of fuel cannot be burned as they should be with a shorter chimney.

A round chimney is better than square, and a straight flue better than a tapering, though it may be either larger or smaller at top without detriment.



The effective area of a chimney for a given power, varies inversely as the square root of the height. The actual area, in practice, should be greater, because of retardation of velocity due to friction against the walls. On the basis that this is equal to a layer of air two inches thick over the whole interior surface, and that a commercial horse-power requires the consumption on an average of 5 pounds of coal per hour, we have the following formulæ:

$$E = \frac{0.3\,H}{\sqrt{h}} = A - 0.6\sqrt{A} \quad . \quad 1$$

$$H = 3.33\,E\sqrt{h} \quad . \quad . \quad . \quad . \quad . \quad . \quad 2$$

$$S = 12\sqrt{E} + 4 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad 3$$

$$D = 13.54\sqrt{E} + 4 \quad . \quad . \quad . \quad . \quad . \quad 4$$

$$h = \left(\frac{0.3\,H}{E}\right)^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad 5$$

[1] Extract from "*Steam*," a book which can be procured of the Babcock & Wilcox Company of New York, without cost.

In which H = horse-power; h = height of chimney in feet; E = effective area, and A = actual area in square feet; S = side of square chimney, and D = diameter of round chimney in inches.

To find the draught of a given chimney in inches of water: *Divide 7.6 by the absolute temperature of the external air* ($\tau_a = t + 460$); *divide 7.9 by the absolute temperature of the gases in the chimney* ($\tau_c = t' + 460$); *subtract the latter from the former, and multiply the remainder by the height of the chimney in feet.* This rule, expressed in a formula, would be:

$$d = h\left(\frac{7.6}{\tau_a} - \frac{7.9}{\tau_c}\right).$$

To find the height of a chimney, to give a specific draught-power, expressed in inches of water: *Proceed as above, through the first two steps, then divide the given draught-power by the remainder,* the result is the height in feet. Or, by formula:

$$h = \frac{d}{\left(\frac{7.6}{\tau_a} - \frac{7.9}{\tau_c}\right)}$$

To find the maximum efficient draught for any given chimney, the heated column being 600 Fahrenheit, and the external air 62 degrees: *Multiply the height above grate in feet by .007, and the product is the draught-power in inches of water.*

The above diagram shows the draught, in inches of water, for a chimney 100 feet high, under different temperatures, from 50 degrees to 800 degrees above external atmosphere, which is assumed at 60 degrees. The vertical scale is full-size, and each division is $\frac{1}{10}$ of an inch. It also shows the relative quantity, in pounds of air, which would be delivered, in the same time, by a chimney under the same differences of temperature. It will be seen that practically nothing can be gained by carrying the temperature of the chimney more than 350 degrees above the external air at 60 degrees.

To determine the quantity of air, in pounds, a given chimney will deliver per hour, multiply the distance in inches, at given temperature, on the diagram, by 1,000 times the effective area in square feet, and by the square root of the height in feet. This gives a maximum. Friction in flues and furnace may reduce it greatly.

The external diameter of a brick chimney at the base should be one-tenth the height, unless it be supported by some other structure. The "batter" or taper of a chimney should be from $\frac{1}{16}$ to $\frac{1}{4}$ inch to the foot on each side.

Thickness of brickwork: one brick (8 or 9 inches) for 25 feet from the top, increasing $\frac{1}{2}$ brick (4 or 4½ inches) for each 25 feet from the top downwards.

If the inside diameter exceed 5 feet the top length should be 1½ bricks, and if under 3 feet it may be ½ brick for 10 feet.

SOCIETIES

THE architects of Philadelphia gave a dinner to the lately appointed United States Supervising Architect, James H. Windrim, at the Hotel Bellevue, Philadelphia, on Saturday evening, April 20, 1889. Owing to the date only the following were in attendance: Messrs. T. Roney Williamson, John Stewardson, Frank Miles Day, Amos J. Boyden, R. G. Kennedy, Guy King, W. B. Powell, John J. Deery, Wilson Eyre, Jr., C. Balderston, Oscar Frotscher, Walter Cope, Lindley Johnson, Thomas Lonsdale, John Ord, Grayson P. MacArthur and John T. Windrim, the eldest son of the guest. Mr. T. P. Chandler presided, and after the *menu* had been about half discussed, he introduced the guest of the evening in unusually brief, though well-chosen words. Mr. Windrim evidently felt the compliment of the occasion, and referred in feeling terms to the invitation of his professional brothers and to the letters of congratulation he had received from his comrades here on his appointment. He then rapidly sketched his connection with his old master, John Notman; the duties of the Supervising Architect of the Treasury Department; his hopes of lifting the office from politics to a plane of business and artistic excellence, and referred humorously to some of the petty troubles which such an official daily encounters. His impromptu remarks were liberally applauded by his colleagues, particularly where he spoke with great earnestness of his intention to appoint men of mechanical and technical knowledge to positions of superintendents and supervision, instead of the recent crop of ward politicians and men utterly unfamiliar with the work in hand.

Mr. Frotscher, after making extended remarks upon the Palais de Justice, Bruxelles, said Americans were in advance in original work. Mr. John Ord, in speaking of the development of the art in America, knew that the honored guest would give as high a character to the æsthetic requirements of his trust as to other departments. Mr. T. Roney Williamson made pleasurable remarks and Mr. John J. Deery dilated upon the benefit of re-unions of architects. Mr. Wilson Eyre, Jr., made complimentary remarks, and referred to his hurried trip to the Appenines during the early winter. Mr. Walter Cope gave a sketch of his tricycle sketching tour in Normany. Mr. John Stewardson, Mr. R. G. Kennedy, Mr. Guy King, Mr. W. B. Powell, Mr. Lindley Johnson, Mr. Thomas Lonsdale, Mr. Grayson P. MacArthur, Mr. Amos J. Boyden, Mr. John T. Windrim and Mr. Frank Miles Day were at their best with salutations, which were highly gratifying to Mr. Windrim.

It is proper to state that Mr. T. Roney Williamson was Chairman, and Mr. Frank Miles Day was Secretary of the Committee which brought about this fraternal meeting of gentlemen devoted to the best interests of a great people. The parting was as generous as the reception, and will be long remembered by all the participants.

THE ARCHITECTS' CLUB OF ST. LOUIS.

I ENCLOSE a copy of the Constitution and By-Laws of the Architects' Club of St. Louis, which has just been formed with a membership of fifteen. The Executive Committee for the first year are: President, P. P. Furber; Secretary, L. C. Bulkley; Treasurer, A. F. Rosenheim. The Committee thought you might like to know that St. Louis was trying to keep up with the procession.

Very truly yours, P. P. FURBER.

ST. LOUIS, April 18, 1889.

COMMUNICATIONS

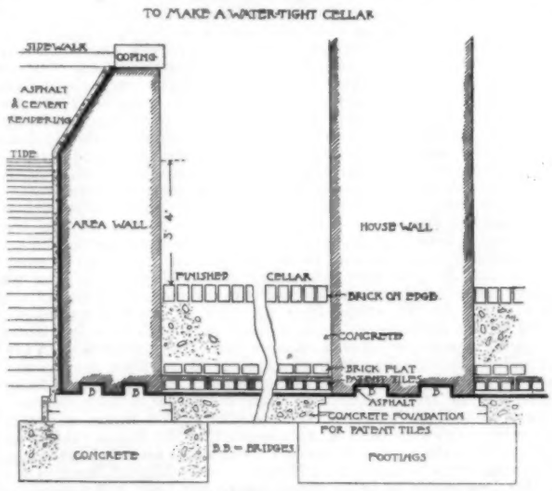
[*The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.*]

HOW TO MAKE A CELLAR WATER-TIGHT.

NEW YORK, N. Y., April 15, 1889.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— Instead of lining the *inside* of walls with asphalt for preventing the ingress of water, I have found that the best method was to build the cellar wall as per sketch and place the asphalt



(afterwards covered with cement rendering) on the *outside*. This has been tried successfully in several warehouses on West Street, New York City, for the Rhinelander and Renwick Estates and by so doing valuable cellar-space was saved and the weight of the wall utilized for resisting tide pressure. In one instance the cellar floor was 3′ 4″ below high-tide level. The use of a part of the floor is patented. The suggestion about asphalt is for professional use.

Yours faithfully, GEORGE MARTIN HUSS.

A BOOK FOR A BEGINNER.

INDIANAPOLIS, IND., April 22, 1889.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— Please state in the next issue of the *American Architect* a good work on general construction for a beginner. Also state where same can be purchased, and oblige R. E. O'BRIEN.

["*Building Superintendence,*" by T. M. Clark. Ticknor & Company, publishers.—EDS. AMERICAN ARCHITECT].

NOTES & CLIPPINGS

NEW PROCESS OF HARDENING PLASTER-OF-PARIS.— The French Academy of Sciences has just received a communication from M. Julte on a new process of hardening plaster so as to adapt it to the construction of flooring in place of wood, and to other purposes for which it cannot be used in its ordinary state on account of its want of hardness and resistance to crushing. M. Julte recommends the intimate mixture of six parts of plaster of good quality with one part of finely sifted, recently slaked white lime. This mixture is employed like ordinary plaster. After it has become thoroughly dry, the object

manufactured from it is saturated with a solution of any sulphate whatever whose base is precipitated in an insoluble form by lime. The sulphates best adapted for the purpose, from every point-of-view, are those of iron and zinc. With sulphate of zinc, the object remains white, as might be supposed. With sulphate of iron, the object, at first greenish, finally assumes, through desiccation, the characteristic tint of the sesquioxide of iron. The hardest surfaces are obtained with iron, and the resistance to breakage is twenty times greater than that of ordinary plaster. In order to obtain a maximum of hardness and tenacity, it is necessary to temper the limed plaster well in as brief a space of time as possible, and with no more water than is strictly necessary. The object to be hardened should be very dry, so that the solution employed may penetrate it easily. The solution should be near the point of saturation, and the first immersion should not exceed two hours. If immersed too long, the plaster would become friable. The proportion of the lime and plaster are arbitrary, and may be varied according to the results to be obtained; nevertheless, the proportions of one to six have given the best results. As it is important that the plaster should not be spread over the surface by passing and repassing the trowel for too long a time, the fastest workman should always be the best one to employ. When sulphate of iron is used, the slabs are of the color of iron-rust; but if linseed oil boiled with litharge be passed over the surface they assume a beautiful mahogany color, and offer a certain superficial elasticity to the tread. If a coat of hard copal varnish be added, the color becomes very beautiful. On spreading a two or three inch layer of limed plaster in a room, and treating it in the way above described, we obtain a floor which is as smooth as a mirror, and which, in most cases, fulfils the office of an oak floor, but which has the advantage over the latter of costing four times less.—*Invention.*

Rock-Paintings in West Virginia.—The erection of the new Government dam in the river near Charleston, has hidden from sight the famous "pictured rock," one of the familiar landmarks of the Kanawha Valley, and one which has occasioned much wonder and fruitless speculation. The rock was located near the mouth of Paint Creek, and, while the river was in its natural condition, was visible at low water every summer. Some years ago a part of the stone was removed for building purposes, an act of vandalism which should have been prevented at all hazards, and now the remainder is submerged at all seasons of the year. When whole, the surface of the "pictured rock" was about 20 by 30 feet in extent, and was covered with representations of animals, fish, and fowls, carved deep in the smooth surface. On one side were the figures of a man and a bear, the latter being about life-size. Near by was a buffalo track, and a short distance away was the representation of a large fish and a number of footprints, evidently representing the imprint of a child's feet. The work was evidently done by prehistoric people, as the traditions of the valley are that the representations were on the stones when the first white men visited the region, and that they then bore unmistakable signs of great age, being water-worn and smooth. The vicinity of Paint Creek is rich in aboriginal and prehistoric relics, and a volume might be written on the discoveries which have been made there. Almost every excavation brings to light something of interest to the antiquarian, and there is every evidence that in past ages the valley was thickly peopled by an unknown race, probably contemporary with the mound builders of the Ohio valley. At Moorefield, from the time of the first settlement, the cliff known as the Gap Rocks, in the Petersburgh Gap, has borne the gigantic representation of a common fox. The picture is upon the sheer and inaccessible face of the rock, some 30 feet from the top and nearly 100 from the bottom, and being colored a dingy yellow, in sharp contrast to the brown stone, has been visible for a long distance. Recently, Glen McGill of Ohio, who was visiting Cell Beans, near this place, went out to view the fox, accompanied by Mr. Beans. After an inspection from the bottom of the cliff the two men ascended to the top, and making a rope fast to a tree, McGill lowered himself down to the fox. He describes it as being about twelve feet long, and painted or plastered upon the cliff with a substance resembling earthenware glaze, which is as hard as the rock itself. The surface of the fox is quite rough, as though the stuff was roughly smeared on by hand before it hardened. There was a high wind blowing at the time McGill made his venture, and he ran considerable risk. He took along a mallet and chisel intending to cut his name on the fox, but was prevented by the force of the wind, which swung him about at an alarming rate.—*New York Sun.*

The Dry-Dock at Newport News, Va.—The largest dry-dock in the United States, built by the Chesapeake Dry-Dock and Construction Company, was opened at Newport News, Va., recently. In connection with the ceremony of opening, the United States monitor "*Puritan*" was taken into the new dock. A large party was present, including Governor Lee and many naval officers. As the party arrived the dock was flooded, and preparations were made for taking the immense iron-clad "*Puritan*" into the dock. Lieutenant Tyler of the "*Mayflower*" was in command, assisted by Constructors Bowles and Linnard, and the "*Puritan*" was hauled in and placed in position. The gates were closed, and the powerful pumps put to work to clear the dock of water, which was done in about two hours. The "*Puritan*" is 300 feet long and 60 feet wide, but, to see her in the dock, she looked almost like a tug-boat. The dock is 630 feet long from head to outer sill, 130 feet wide at the top and 50 feet at the bottom, and 33 feet deep, with a slope in the bottom of 24 inches to the 560 feet. The approach to the dock is piling, 250 feet long and 150 feet wide, while on each side piers 80 feet wide afford ample wharf-room. The caisson is an iron structure, 96 feet long on top, 50 at bottom, and 33 feet deep. The dock is supplied with two centrifugal pumps of a capacity of 40,000 gallons a minute, each of which empties it in 1 hour and 36 minutes. The combined power of the two engines is 500 horse-power. The new dock will accommodate any ship now afloat. The peculiar construction of this dock meets with the hearty approval of sea-captains, as it does not strain their ships in the least.—*Springfield Republican.*

TRADE SURVEYS.

In all the voluminous statistics published relative to railway earnings, banking operations, mercantile transactions and manufacturing activity, one underlying tendency is observable, viz., the lessening of cost and the improvement and expansion of facilities. Capital is earning less in all organized channels, and hence the outflow into new fields and avenues where the rewards are, or promise to be, greater. The narrowing margins instead of checking investments is increasing them, in order that greater capital and greater centralization of effort and management may lessen cost per unit of product, or service or advantage conferred. There are two marked tendencies in business seemingly contradictory, but in reality working towards one result, viz., the centralization of enterprise on one hand, and the springing-up of a multitude of little enterprises on the other. The construction of railroads has necessitated this on one hand, and made possible individual enterprise on the other. Very good, cheap land is rapidly disappearing, and speculative holdings are increasing at an alarming rate. Eventually, there will be a pressure from agricultural employments to mechanical when land rises in value beyond a certain price, and competition will then depress the value of mechanical labor. The virtue and strength of our particular form of Government will then become evident, or its inherent weakness will be then manifest. But, meanwhile, social and economic problems are in process of solution, which will prevent or control the appreciation of land on one side and the decline of wages on the other hand. The present tendency is the reverse of this, viz., capital's share is declining and labor's share is increasing, and this tendency will continue until a forced settlement of accounts will be made between debtors and creditors and lenders and borrowers. Questions like these and others of a more or less abstract character are discussed by practical men much more than editors imagine, and very comprehensive and logical views are expressed. The common and business sense of business men recognizes the fact that great changes are taking place, and that new conditions and capabilities are developing out of our rapid and extraordinary growth. The events of the week indicate an enlargement of business in railroads, banks, manufactures and among those engaged in the distribution of merchandise. Yet, the unfavorable influences which have been hanging around the market for months have not disappeared, and probably will not for some weeks to come. The iron and steel makers are still waiting for summer business. Rail-makers book very little new business. Southern iron-makers are busy and new furnaces are going up. The talk in trade circles still is, that an enormous amount of work will be entered upon by early summer. Crop conditions are favorable; agricultural interests are prosperous. The grangers have the railroads by the throat, at last, instead of by the tail, as they had a decade ago. Railroad conditions have not improved; earnings decline; rigid economical management is being resorted to. There is urgent need of the development of ability in that direction; managers feel deeply concerned at the railroading prospects, and cannot seen their way out unless they can in some way charge more for a short haul than a long one, per mile. The Inter-state Commerce Commission is loaded up with six months' business of a character which cannot be cast aside. Numerous adjustments are imperatively demanded at the hands of such an impartial tribunal. A great deal depends upon the settlement of the railroad problem; the investment of very many millions of dollars will be determined by it. Financial authorities await the outcome with more than ordinary interest.

If it can be demonstrated that National and State railroad boards can do justice to shipping interests and manufacturing interests, and yet do no injustice to stockholders and railway interests generally, then the railroad, investing and business interests will square themselves to and with that result, and fresh railroad construction will be plunged into, and the beneficial influences on all other industries cannot be measured. At present producers are keeping a tight grip upon production, and jobbers are refusing to carry more than a safe volume of goods. Manufacturers are working from ten to forty per cent below their capacity. The iron-workers West threaten to cease work for two months during the year. The glass-workers have not worked during the summer months at any time. The anthracite-coal producers are working one-half capacity, and barge companies are preparing to haul coal in barges along the coast, instead of by schooners, as heretofore. Extensive preparations are being made in Pennsylvania to utilize the Poughkeepsie Bridge by coal-miners, lumber and iron manufacturers. The textile manufacturers are not adding much to their output. Much satisfaction is expressed by domestic woolen manufacturers over the prospects of an advance of duties on woolens to a practically prohibitive limit. Hardware manufacturers, except in specialties, are blocking up. Nail-makers East are selling nails almost at cost; in the West better prices rule. There is an active demand for sheet-iron pipe iron, barbed-wire and merchant-steel. Wood-working machinery interests are not crowded, but implement and tool makers are fairly busy. Locomotive-makers are working twenty-five per cent below capacity, and car-builders thirty-three per cent, approximately. Better conditions are looked for in July. An early fall trade is expected by jobbers and manufacturers. Adjustments are progressing among Western coal operators and miners. Architects report pretty full building activity. Architectural ability is in demand, especially in Western cities and towns, but it is obliged to exceed the prescribed professional limits frequently and be useful all around. Building material is kept in good supply. Lumber, excepting poplar, is plenty. The lumber manufacturers have succeeded very well in maintaining organizations that repress undue competition. Supplies East are large, but under control. A great deal of saw-mill machinery is still going up. In fact, the expansion of manufacturing capacity is enormous, and to some people it is alarming. If it were possible to convene a congress of business men to decide upon how much manufacturing to do, no resolution could pass authorizing as much as is now in hand and projected. Among the agricultural interests, the mortgage indebtedness is being paid off according to agreement. In manufacturing channels the volume of borrowed money is increasing very rapidly, but the amount hazarded in any one industry is not very large. There is nothing wrong on the commercial horizon. The copper syndicate had a meeting in Paris on Monday to liquidate, but poor headway was made. British fingers that were burned are seeking redress behind legal measures, and this does not add to the peace of mind of the speculators in their Waterloo defeat. Prices are drooping, and American exports are practically nothing. Deeper interest is being taken in schemes to foster exporting enterprise, but no very practical plan can be projected until after the coming conference of North and South American governments. Capitalists have been critically examining our ship-building facilities, it is thought with a view of possibly starting new ship-yards, should such enterprise be found advisable after Congress shall have had an opportunity of acting in the interests of a revival of the American export trade.

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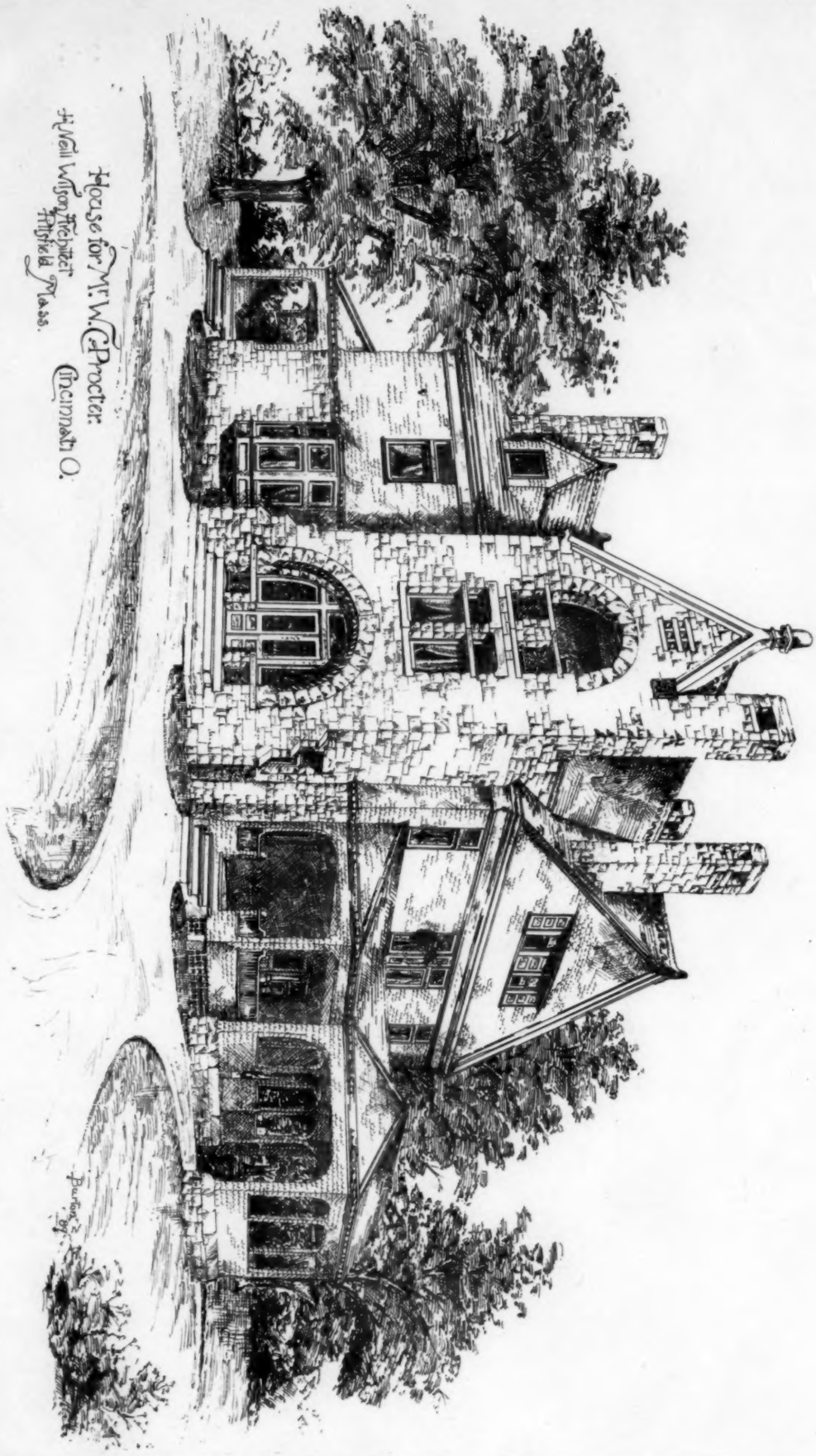

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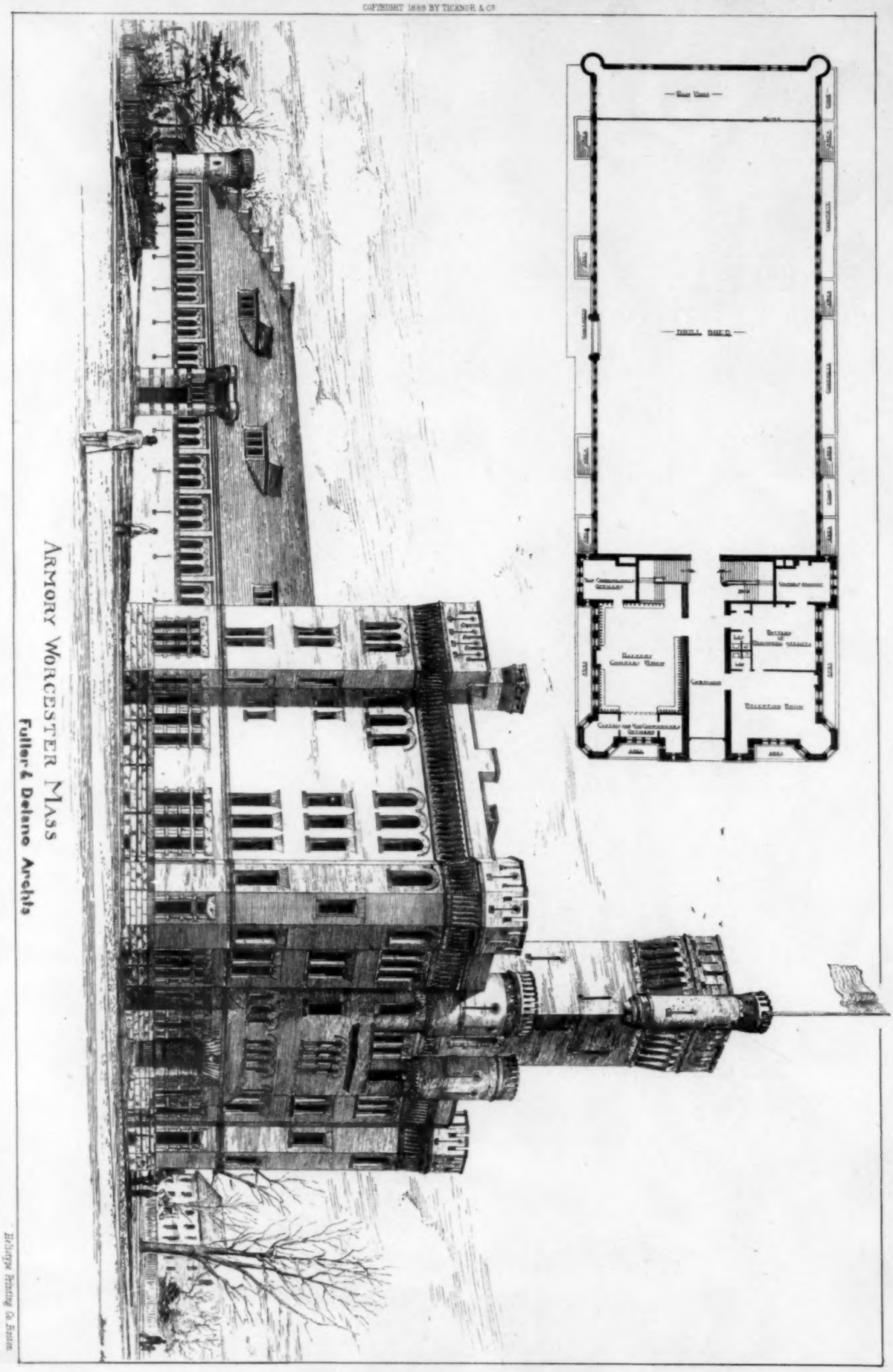

ARMORY WORCESTER MASS

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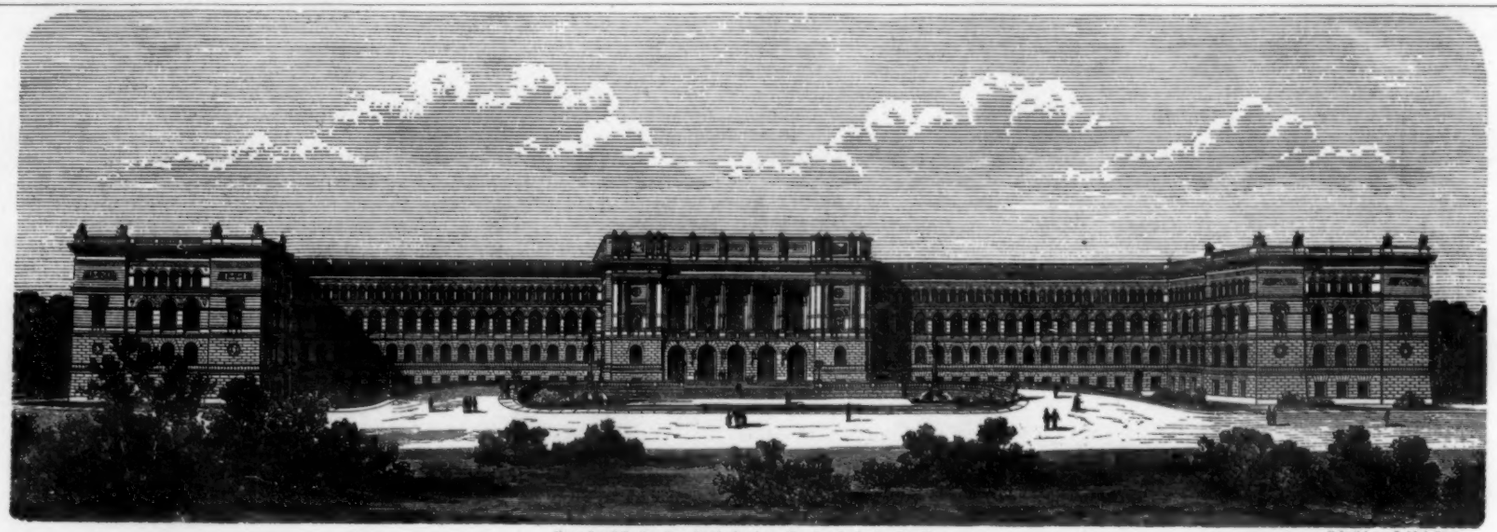
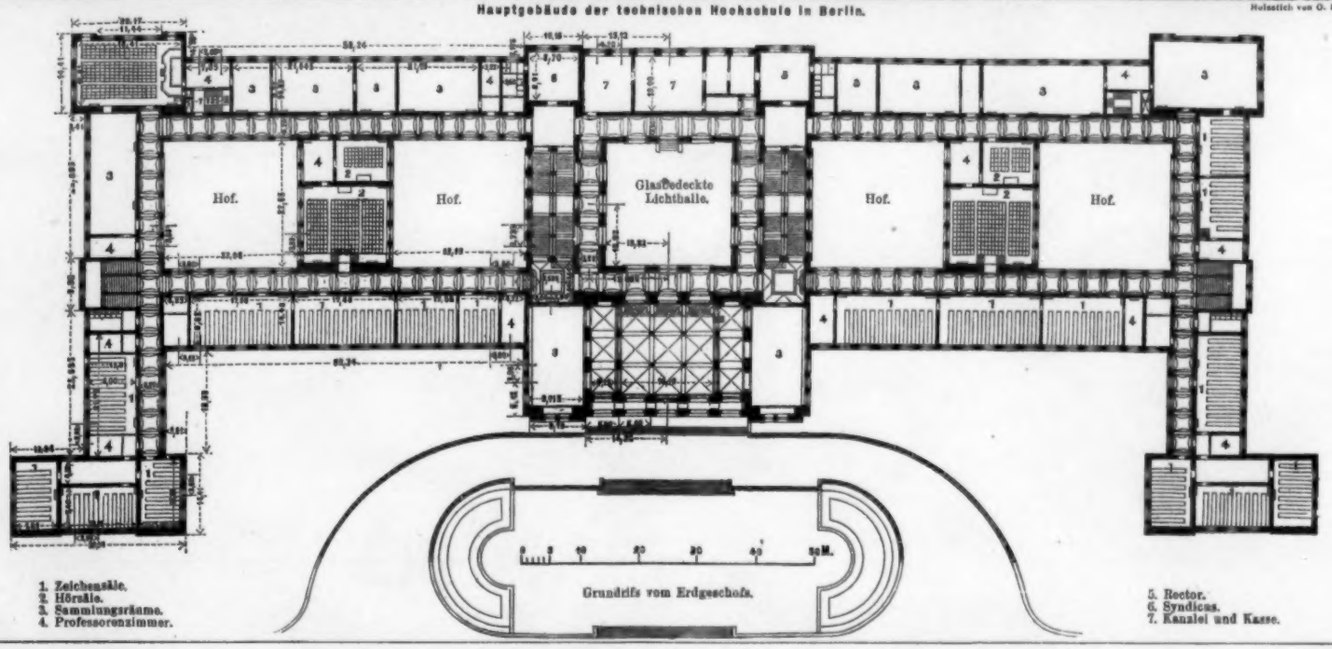


Hauptgebäude der technischen Hochschule in Berlin.

Holzstich von O. Thiel, Berlin.



Grundriss vom Erdgeschoss.

1. Zeichensäle.
2. Hörsäle.
3. Sammlungsräume.
4. Professorenzimmer.
5. Rector.
6. Syndicus.
7. Kanzlei und Kasse.

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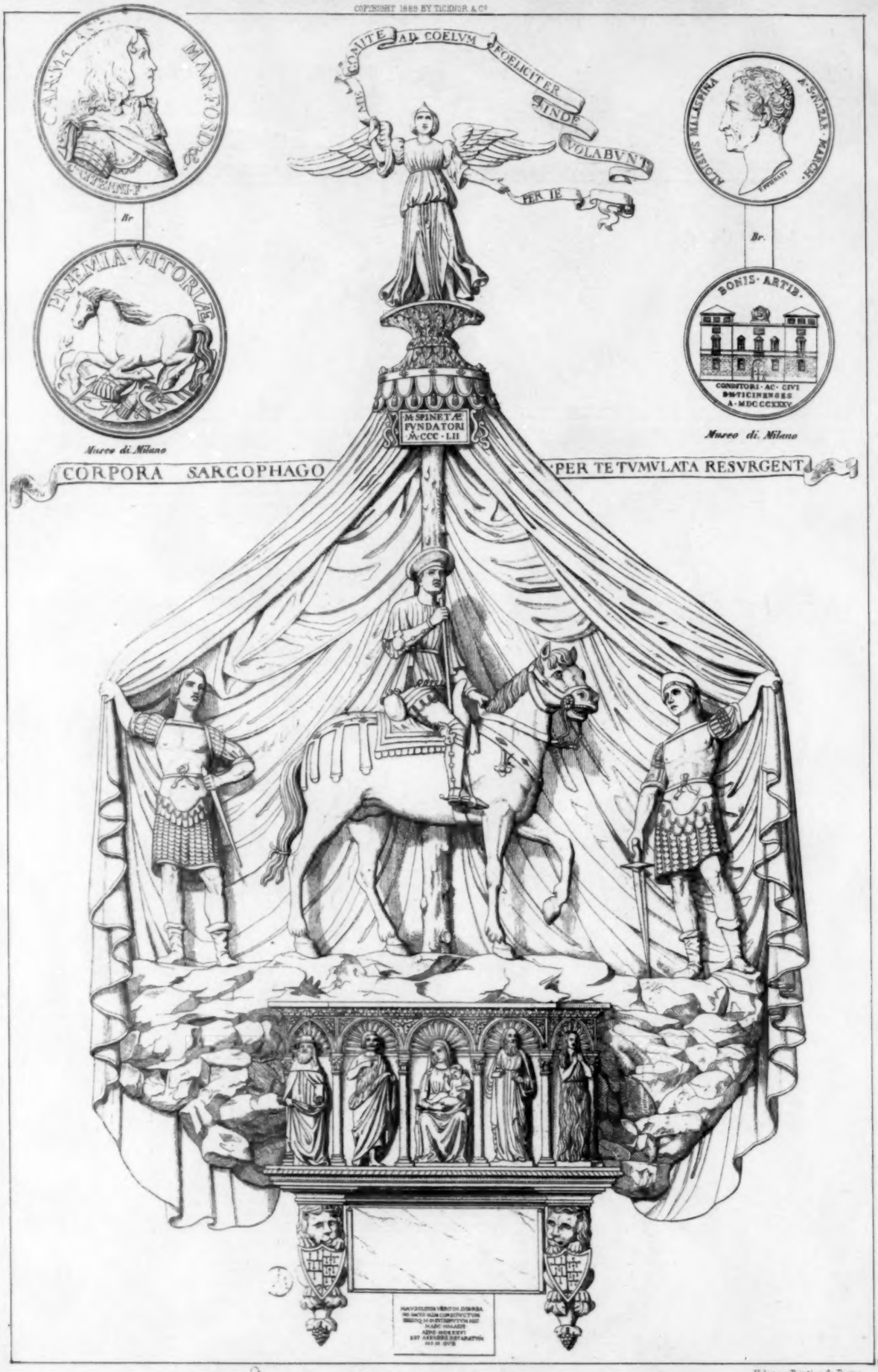

SPINETTA MALA SPINA, S. GIOVANNI IN SACCO VERONA.

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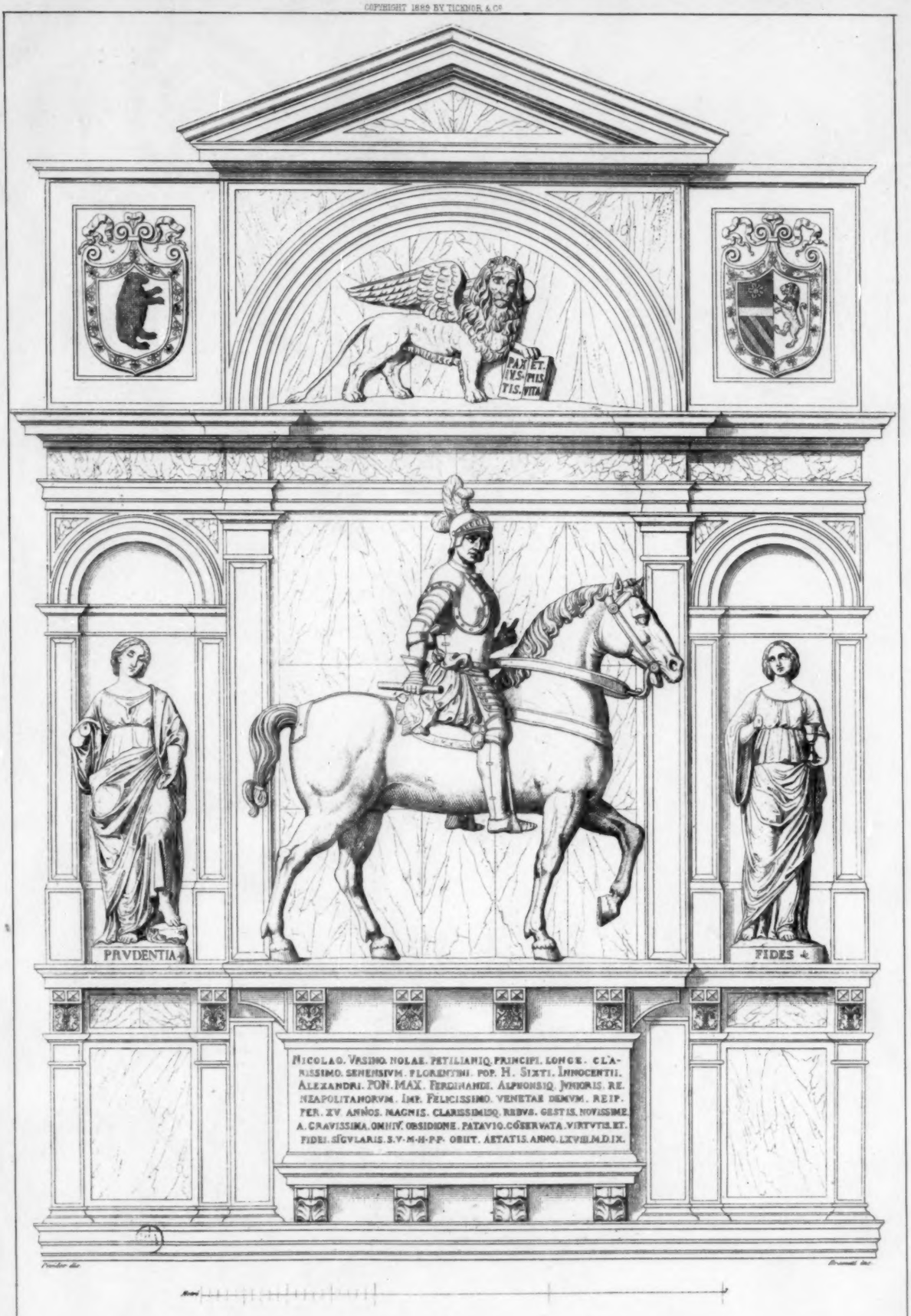
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Monumento di Nicola Orsini conte di Pitigliano morto nel 1510 nella chiesa dei SS.ti Giovanni e Paolo in Venezia.

NICCOLO ORSINI, S.GIOVANNI E' PALOLO, VENICE.

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